The Chemical Age

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After Ninety Years

HAVING completed ninety years' useful work in the service of chemical science and engineering, the Chemical Society went to Scotland to celebrate its anniversary last week, and from the report of the meeting in pages 271-273 it will be gathered that the members were accorded a welcome worthy of the occasion. Professor G. G. Henderson, the present year's president, is one of a long line of able men whom the Glasgow University has given to chemistry, and it was distinctly fitting that the society should visit the city and receive a cordial civic welcome during his presidential year. Glasgow has its own chemical works at Provan, and many members availed themselves of the Lord Provost's invitation to visit the works, while others inspected the Ardeer explosives factory by the invitation of Imperial Chemical Industries, Ltd. Of the meeting itself, it must be placed on record that Professor Henderson made an excellent president, and provided the members with considerable food for thought in his address on the need for co-ordination in chemical activities.

Lord Weir, submitting the toast of the Society at the anniversary dinner, spoke of the march of chemical and other scientific progress, and said he sometimes wondered if, if these days, the scientific brain was sufficiently called into consultation when the major lines of national policy were decided upon. Naturally he had a great respect for both the politician and the business man; but he was of the opinion that at no time should either the Board of Admiralty, the Air Council, or the Army Council—he meant any one of them at any one time—be without a member having scientific or engineering attainments. In that suggestion he was ignoring all questions of status or recognition, however justifiable these would be, and confined himself to the simple wisdom of having representation of that type of brain. He felt there would be something naturally useful and valuable in bodies such as the Chemical Society pursuing an objectice of that kind.

Census of Chemical Production

VOLUMINOUS statistics with reference to the chemical industry are contained in Preliminary Report No. 7 on the Fourth Census of Production, comparing 1930 with 1924, issued by the Board of Trade, a summary of which appears in another page of this issue. Our impression of the report is that its usefulness is scarcely proportionate to the amount of trouble and expense which must have been involved in its preparation. It is typical of a good many Government publications in that it leaves to the individual student of the statistics the task of delving into a great mass of figures to draw conclusions which might, with considerable advantage, have been incorporated in a general introduction or summary. After attempting to digest four foolscap pages of tabulated matter, one is left wondering whether the net effect is a step forward or a decrease in the activities of the industry, and it is only in a 13-line summary at the end of the report that any really useful indication is given of the meaning of the earlier figures.

Two main criticisms of the report are that it excludes from its consideration all firms employing an average of ten or less persons, and that it takes no account of the allied industries, such as the by-product side of the gas and coke oven industries, which, in the aggregate, are responsible for a considerable contribution to the chemical activities of this country. However

accurate the figures given in the report may be, they cannot, therefore, be regarded as a true index of the state of the industry. We are acquainted with a number of manufacturing firms which happen to employ ten people, or just under, and it is unfortunate that their production should be excluded from the report on that ground alone.

Some Comparisons

SOME interesting comparisons may be drawn from the summary of total make of certain important chemical products in 1930 compared with 1924. Converting the figures given in the Census from weight to percentages, we find that the production of sulphate of ammonia (20.6 per cent. nitrogen) increased in the six years by 773 per cent. Formaldehyde came next with an increase of 554 per cent., collodion next with 165 per cent., potassium chloride (muriate) 133 per cent., acetic acid 114 per cent., and potassium sulphate 111 per cent. Some of the products showed considerable decreases compared with 1924. Carbonic acid gas, compressed, for example, fell by 37 per cent., sulphuric (100 per cent.) acid fell by 26 per cent., sodium compounds by 18 per cent., and sulphate of alumina 17 per cent.

The summarised results show that the total value of goods made and work done (gross output), fell from £54,472,000 in 1924 to £50,665,000 in 1930, representing a decrease of just under 7 per cent. The cost of materials used fell from £29,765,000 to £25,546,000, or about 14 per cent. The net output per person employed, despite the increased use of mechanical methods of production, decreased from £369 to £356, or 3½ per cent. There was, however, a net increase in net output of 1.6 per cent., the figure for 1930 being £25,111,000, against £24,696,000 in 1924. The average number of persons employed in 1930 was also higher by 5.3 per cent., the respective figures being 67,012 for 1924 and 70,618 for 1930. The report also gives information with regard to the power employed in the chemical industry in the two years under review. The outstanding feature of the comparison is the great increase in the capacity of steam turbines, both for driving dynamos and for other uses, and the large proportion of such turbines that were not ordinarily in use in 1930.

Non-Caking Fertilisers

THE development of fertilisers in a new concentrated form, to which reference is made on page 274 of this issue, is of outstanding interest, as such fertilisers are said to contain 64 per cent. or more of actual plant food. The advantages of such a highly concentrated product are evident when we learn that farmers in the United States, to take one instance, are now paying $30,000,000 (roughly £6,000,000) annually for transporting and handling ordinary fertiliser, 84 per cent. of which is inert matter with no plant food value. In developing this fertiliser the chemists of the American Company, Swann Research Inc., have solved a problem that has engaged the attention of agricultural chemists for many years. When plant foods are merely mixed together in the ordinary manner, they usually show a marked tendency to absorb moisture and cake together, and may also separate out from the mixture in non-uniform masses. With high concentrations, such fertilisers are therefore very difficult to apply to the soil and also difficult to distribute evenly, but the production of such fertilisers in granular form has solved this problem. The granules of the concentrated fertiliser, now in production on a semi-manufacturing scale, are hard and firm, uniform in composition, dustless and non-caking, even in damp humid climates. Their size and shape also permits them to be easily and accurately applied to the soil by means of the simplest type of mechanical distributors, even when the rate of distribution is as low as 5 lb. of fertiliser per acre.

The Drumm Battery

IN view of the chemical considerations that are involved, chemical engineers as well as their electrical friends are watching with interest the Drumm battery trials which are being carried out in Ireland. The Drumm cell is an alkaline battery, of simple, strong and inexpensive construction. Its positive plates contain essentially oxides of nickel, as in other alkaline batteries. The characteristic new features of the cell are comprised in the electrolyte, which contains dissolved zinc oxide, and in the nickel negatives, which become coated with metallic zinc on charging. The processes both of zinc electro-deposition and of solution during discharge can be carried out at high rates without any important loss of efficiency, and here can be seen the real advance made by Dr. Drumm. Briefly, he has produced a cell of considerably higher voltage than others of the same type, one whose specific normal discharge and charging rates are respectively four times and twice those of other cells, and one whose discharge rate can be further doubled or trebled for acceleration purposes without any difficulty. The efficiency at these high normal loads is very appreciably greater than that of similar existing cells working at lower rates. And there are positive reasons for anticipating that the cell will have a long life. In the battery designed for the train now being introduced on the Dublin-Bray service (14½ miles, 11 halts, 15 to 18 minutes spent at termini), the specific output per single cycle is low, perhaps 15 per cent. of that of other alkaline cells. But with charging stations at the termini, 20 cycles or more if required can readily be put through per day, with the result that the specific daily output will be three times the usual. The sponsors of this cell do not suggest that it will compete with existing batteries in any but certain, at present relatively restricted fields. But they claim that, in virtue of its capacity for furnishing heavy currents, a number of transport problems hitherto closed to storage batteries, can now be attacked with hopes of success.

The Calendar

April 1.—Oil and Colour Chemists' Association (London Section). Annual dinner. Connaught Rooms, London.

April 1.—Society of Chemical Industry (Manchester Section). Annual general meeting. "Laboratory Tests of Lubricants and their Relation to Engine Tests." F. J. Slee. 7 p.m. 17 Albert Square, Manchester.

Books Received

APPLIED CHEMISTRY. VOL. II. FOODS. By C. Kenneth Tinkler and Helen Masters. London: Crosby Lockwood and Son. Pp. 284. 15s.

THE CHEMICAL MANUFACTURERS' DIRECTORY FOR 1932. London: Simpkin, Marshall, Ltd., Pp. 204. 4s. 6d.

Annual Meeting of the Chemical Society

First Visit to Scotland

THE Chemical Society made its first visit to Scotland on March 17, when Glasgow had the honour of welcoming its Fellows and Chemists, on the occasion of the Society's 91st annual general meeting. The proceedings opened with a civic reception by the Provost and Corporation of Glasgow in the City Chambers. Sir Thomas Kelly presented the official welcome, and referred to the long and honourable history of the Society. The corporation, he said, had a particular interest in chemistry, for they themselves were chemical manufacturers on a large scale. It was a fact in which he took particular pride that Glasgow had supplied to the Chemical Society its first president, Thomas Graham. He was born and educated in Glasgow, and was the first occupant of the chair of chemistry in Anderson's College, now the Royal Technical College, where he instituted, for the first time at any rate in Scotland, the practical system of teaching chemistry. The citizens of Glasgow had in their midst a worthy memorial to him in the form of a statue in George Square, presented to the city by another very distinguished chemist, James Young. The Society itself was the memorial of this distinguished citizen to the Fellows themselves. He also referred to Sir William Ramsay, another past-president, and also an eminent Glasgow man. It was a particular pleasure to the corporation that the Society should meet in that city under the presidency of Professor G. G. Henderson. He was a man who had also held the presidency of the Society of Chemical Industry and of the Institute of Chemistry, and they rejoiced in the services which he had rendered, not only to chemical industry, but to the professor of chemistry. His influence as a teacher spread far and wide, and to-day many of his students occupied responsible positions in the academic as well as in the industrial world.

PROFESSOR G. G. HENDERSON, PRESIDENT OF THE CHEMICAL SOCIETY, 1932.

Professor HENDERSON expressed the grateful appreciation of the Society for the honour which the Lord Provost and Corporation had conferred upon them, and his remarks were seconded by Sir William Pope, a past-president. There were present about 1,000 people, the majority of whom were associated with various chemical organisations which were participating in the meeting.

On Friday, March 18, the officers and council were entertained to lunch by the University of Glasgow, Principal R. S. Rait, C.B.E., L.L.D., presiding.

In the afternoon the official business of the Society was transacted, and a distinguished gathering of chemists was present. Professor Henderson delivered his presidential address on "The Publication of Chemical Literature."

President's Address

Professor HENDERSON stated that in consequence of the financial burden involved in the publication of chemical literature the necessity had arisen for careful consideration of the present position in regard to the publication of new chemical knowledge generally, of possible closer co-operation with other societies having similar objects, and of possible new sources of income. Probably the suggestion that an endeavour should be made to bring about the merging into one organisation of all the various societies concerned with chemistry would be considered impracticable, but at least, if only for economic reasons, no effort should be spared to promote the closest co-operation among them, and, at any rate, so far as the Society of Chemical Industry was concerned, a very good case could be made out for its re-union with the Chemical Society. Many difficulties would have to be faced, but, given mutual goodwill, these should not be insurmountable.

As regarded the present state and future prospects of the Chemical Society, in certain respects there was every reason for satisfaction, but other aspects of the position gave rise to anxiety. On the assumption that the number of chemists in this country was at least 10,000 it was evident that for some reason or other the majority did not support the Society by becoming Fellows. The position was serious, because any sudden diminution in the Fellowship would mean a partial cessation of the work for which the Society had existed since 1841.

Was it possible for the industry itself, the progress of which depended primarily on the advance of chemical knowledge, to come to their help? If chemical industry in America was justified in assisting chemical publications there, then the industry in this country should help the Chemical Society.

He would further suggest that the Institute of Chemistry might favourably consider assisting the publication of chemical literature, as it had a large income, which showed no sign of diminishing. The Institute had rendered valuable service to the profession in many ways, and he did not think that the terms of its charter precluded it from widening the range of its beneficent influence by giving a substantial annual contribution to the Publications Fund of the Chemical Society. In doing so it would indubitably promote the welfare of the profession, for it could not be reiterated too frequently that the progress of chemistry was dependent upon the publication of results of research work in all branches of the science.

Sir JAMES IRVINE, Principal of St. Andrew's University, proposed a vote of thanks to Professor Henderson. He made felicitous reference to the great work which the president had done during his term of office, and also to the service he had rendered in bringing so important a subject before the chemists of the country.

The Anniversary Dinner

In the evening the anniversary dinner was held at the Grosvenor Restaurant, when 190 guests were present. Professor Henderson occupied the chair, and the company included many leading figures in Scottish civic and educational affairs.

Lord WEIR proposed the toast of "The Chemical Society." He said that in the 90 years of the Society's history chemical science had marched more or less steadily from one brilliant victory to another, and at each step their Society had nobly played its valuable part and discharged its helpful functions. In a speech to the Society 40 years ago, Lord Salisbury, who was then Prime Minister, said: "I trust the chemistry of the future may teli us why we have to go to Chile for our nitrogen products, and why we cannot take them from the air around us." Since then chemical science had done more than tell the nitrogen tale. It had solved the production problem, and while the world might not yet be safe for democracy, it was

at least safe from starvation. Science had played an enormous part in making the production of goods and commodities easier and cheaper, and what had been the result? Surely the most tremendous economic implications, such as they witnessed to-day. It was true that the chemist, the physicist, the biologist, or the engineer must nowadays be mainly a specialist. He had little time for any other attitude towards life. Accordingly, the politician or the so-called business man became the framer and controller of policy. Naturally he had a great respect for both the politician and the business man, but he sometimes wondered in these days, when the work of the scientist had become so predominantly the bricks and mortar of the political and industrial edifice, whether the scientific brain had been sufficiently called into consultation when the major lines of national policy were decided upon.

Their Society was in many ways fundamentally Scottish. The famous Graham was their first president, and it was a fitting thing that their present president was a great Scotsman. Professor Henderson was more than that; he was a very eminent scientist, with a profound appreciation of the close relationship which should exist between pure science and the chemical industry. Among many debts which the chemical industry owed to Dr. Henderson, possibly the greatest had been his almost prophetic knowledge of the kind of training which the chemical industry of the future would require from its young recruits. In that connection he had rendered to the country and to the Empire a service of incalculable value.

Professor HENDERSON, in reply, said it was understandable that the publication of scientific research was clearly of benefit to the whole country. Was it unreasonable, therefore, to suggest that at least a large proportion, if not the whole, of the cost of these publications now borne by the impecunious members of various societies should be borne by the State?

Glasgow's Enterprise

Sir THOMAS HOLLAND, Principal of Edinburgh University, responding to the toast of "The Guests," proposed by Professor J. F. Thorpe, said that some 24 years ago, as president of a Commission on the administration of the Burma Oilfields, he saw something of the enterprise of a Glasgow firm in opening up the natural resources of a country which they had entered long before it was British territory. Without them, the Upper Burma fields would have been neglected for many years, and perhaps mismanaged till a still much later period. Later, during a critical stage in the war, when our supplies from abroad became largely cut off, the same commercial undertaking made its output of kerosene available, without increase of price, to the people of India, and only those who knew the importance of such simple, widely-used necessities in the maintenance of tranquillity, among an illiterate population could form an idea of the military embarrassment that might have occurred but for that act of generous commercial wisdom on the part of the Burma Oil Co. As the administrator then responsible for restraining those inequalities in the distribution of essential supplies which arose from the war, he had occasion to realise more fully than was generally known their national indebtedness to Glasgow commercial patriotism and good sense. There was another side to that work of more direct interest to the Fellows of this great Society, for it was due to the efficiency of Glasgow-trained chemists that we were enabled in the East to make ourselves practically independent of outside sources for essential supplies of aviation spirit, which was obtained from crude oil, previously untried, and even regarded as unsuitable.

Professor H. E. ARMSTRONG proposed the toast of "The Lord Provost and the Corporation of the City of Glasgow," which was replied to by Lord Provost Sir Thomas Kelly, and Principal R. S. Rait responded to the toast of "The University of Glasgow," given by Sir William J. Pope.

Visit to Provan Chemical Works

On Saturday morning fellows and members of the participating societies made a visit, under the charge of Dr. I. V. Hopper, to the Provan Chemical Works of the Glasgow Corporation, by courtesy of the By-Products Committee of the Corporation. A party of about 50 also made a journey to Ardeer Explosives Factory, by invitiation of Sir Harry McGowan, chairman of Imperial Chemical Industries, Ltd.

The visitors to the Provan chemical works were received in the research laboratories, where Bailie Munro extended a cordial welcome. These laboratories occupy the upper floor of a large new building, the ground floor of which has been partitioned off into general offices, including a costing department, all constructed on modern fireproof lines. The building is centrally heated with low pressure steam from the works Ruth steam accumulator. There is extensive storage accommodation on loading banks bounded by railway sidings and with ready road access. For bulk deliveries of hot material insulated rail and road tanks may be filled from these stores. Road making preparations of a viscous nature are filled hot, the stores being heated by internal low pressure steam coils with all steam joints external. Against fire risks the works has installed an independent water main serving water under pressure from a pump kept specially for use in case of fire only. Hydrants are located on all sections with fire hose boxes alongside, and patent fire extinguishing apparatus including compressed carbon dioxide. All boilers containing highly inflammable products are located in pits below ground level. The solid fuel of each plant is coke breeze, so that the works is entirely smokeless.

Modern Boiler Plant.

A new boiler plant in course of construction is of particular interest on account of the modern arrangements for fuel handling and heat efficiency. In the lay-out are included five Babcock and Wilcox boilers with patent chain grate stokers, a 30 ton electric rotary wagon tippler, a Howden Ljungstrom forced draught fan and air preheater as well as an induced draught fan coupled to a chimney dust arrester. The plant dealing with ammonia liquor includes two complete units in parallel for making sulphate of ammonia, and the ammonia stills are arranged so that they may be operated in series for making aqua ammonia as an alternative to the sulphate. A patent Arco regulator controls the metered steam, and recording pyrometers indicate the conditions at critical points in the process.

The crude tar is dehydrated in a Wikner dehydrator and distilled in a battery of 15 ton pot stills with preheaters. There is a total of eight stills in the battery, some of these being filled with fractionating columns and dephlegmators for adapting to light oil and cresylic acid distillation. In the case of cresylic acid the distillation is carried out under reduced pressure. Refined road tars, bitumen mixtures and road emulsions are prepared in mixers adjacent to the tar still battery. A Dorr continuous causticising plant serves the tar acid extracting process with 8 per cent. caustic soda solution. The phenate and cresylate liquors are evaporated in a triple effect evaporator and decomposed with purified carbon dioxide from the ammonia plant. The equipment of the benzol plant includes a monel metal gauze filter for use with the Instill patent solid rectifying agent which is allowed to substitute the older sulphuric acid method of refining when the quality of the crude benzols and naphthas is suitable.

At the conclusion of the visit, tea and coffee were served in the laboratories. Professor G. T. Morgan expressed the thanks of the party to Bailie Munro, convener of the Corporation By-Products Committee, as well as to Mr. MacLeod, Mr. Eadie and the technical staff who had conducted the visitors over the works. Professor Morgan took the opportunity to speak of the vicissitudinous nature of the tar distilling industry, and pointed out how it is necessary to maintain an up-to-date works and staff in order to keep abreast of the times.

Ardeer Explosives Factory

The visitors to the Ardeer factory saw some of the more important plant and processes connected with the preparation of nitroglycerine, the nitration of cotton to produce the various type of nitrocotton used in explosives and for numerous industrial purposes, the production of sulphuric acid and the oxidation of ammonia to nitric acid. The technical department buildings were visited and special attention was given to the analytical and research laboratories built in 1926. The visitors were shown the analytical section which controls the quality of the raw materials and products of manufacture, and afterwards saw some of the laboratories where research is carried out in connection with blasting and propellant explosives safety fuse, acid manufacture, cellulose finishes and the more recent developments in thermoplastic materials. The library attached to the research department proved of great interest. A card index of experimental work carried out by

the research staff, and of published information of interest to the firm has been kept continuously for over 20 years and now contains half a million cards. The methods of recording and filing were explained.

At this point there was an interval for lunch which was served in the main offices. Mr. Rogers, a director of Imperial Chemical Industries, Ltd., presided, accompanied by Professor Henderson, Dr. G. C. Clayton, president of the Institute of Chemistry, and also a director of Imperial Chemical Industries, Ltd., Principal Sir James Irvine, of St. Andrews, Professor F. G. Donnan, Mr. W. Rintoul and Mr. Donaldson.

Mr. ROGERS, in welcoming the Society to Ardeer, expressed the regrets of Sir Harry McGowan at not being present. He referred to his student days under Professor Henderson at the Royal Technical College, and to his friendship with his fellow student, Sir James Irvine. He stressed the need for financial assistance to a society such as the Chemical Society, which was so much concerned with the publication of new knowledge for the benefit of the world at large. He suggested that the great banking corporations should be approached to lend assistance. He had himself never found them enthusiastic, but if they could only be made to realise that their success depended on that of industry, and industry was so much dependent on the applications of chemistry, he felt sure that they could be made to realise that financial assistance for the publication of chemical research would indeed be an investment which would yield a substantial return.

A Friendly Criticism

Professor HENDERSON, in reply, referred with pride to the three old students who sat beside him—Principal Sir James Irvine, Mr. Rogers and Mr. Donaldson. He had, therefore, he said, had an intimate connection with Nobel's for a large number of years. He expressed thanks to Imperial Chemical Industries, Ltd., for the hospitality which had been extended to the visitors. He also expressed appreciation of the work of the staff in making the arrangements for the visit, and for the consideration they had shown to the members of the party. If he might presume to criticise Imperial Chemical Industries, it would be that they did not lay enough importance on informing the public at large of the extraordinary work being done, for example in plastics. He wished the public could be brought to those works so that they might see for themselves the enormous advances that were being made, and realise the assistance given to all other industries by the chemical industry.

On the motion of Dr. R. H. Pickard, a vote of thanks was accorded to the members who had acted as guides to the various parties.

The Testing Station

In the afternoon the party inspected the testing station, where methods and apparatus for testing explosives were explained, including the measurements of power, velocity of detonation and sensitiveness to initiation. The actual working of these tests was demonstrated in a series of experiments. The difference between explosives which are permitted and those which are not permitted for use in fiery mines was well brought out by firing explosives into coal dust in a gallery specially designed for such work. The ignition of coal dust was an impressive spectacle and illustrated vividly the dangers attending such an occurrence in the confined working spaces of a mine.

A few illustrations were given of the use of explosives. The effect of concentrating the action of an explosive by means of clay or sand tamping was shown in the cutting of a steel plate. In a parallel test without tamping the steel plate was merely dented. The sharp cutting action of a high velocity explosive was demonstrated by razing a palisade of railway sleepers with a file of dynamite cartridges laid along its base. A demonstration was also given of the vortex ring produced by the detonation of an explosive. The ring was projected vertically into the air and its progress could be seen and heard for a considerable time. The last experiment in the demonstration was the breaking up of a large cast iron pot, 7 ft. diameter by 7 ft. high, and 2-3 in. thick, by means of a charge of explosive. The pot contained about 5 tons of water and within it was suspended a relatively small charge of explosive, 1½ lb. of gelignite. The force of the explosion transmitted by the water to the sides of the vessel resulted in the breaking of the metal into fairly small pieces, all of which lay within a radius of a few yards. At the same time, the water was projected into a column about 100 ft. high.

At the tea which followed, Mr. Donaldson presented to Professor Henderson a little souvenir of the visit. This took the form of a beautifully mounted section of a steel plate which had been subjected to the power of a T.N.T. cartridge. The cartridge was indented in its base with a suitable inscription and the initials "G.G.H." and the date of the visit.

On Saturday morning a tour was made by a number of the ladies of the party to Loch Lomond, kindly arranged by Dr. M. M. J. Sutherland.

The Rubber Industry's Future

Brief Analysis of the Market

NOW that the last hope of restriction is dead, the rubber industry finds itself free of artificial influences for the first time in a decade, and it is to be hoped that the industry will accept the new position, making no further attempts to raise the ghost of restriction policies.

To understand the present situation, according to *The Financial News*, the observer must realise that rubber is not now labouring under one depression, but under a combination or three, or, more properly, four. They are :—(1) The general depression, (2) the slump of the U.S.A. motor business after the boom of 1929, (3) the excessive capacity resulting from high prices under the Stevenson scheme, and (4) the struggle between the European and the native producer (which is partially connected with item 3).

Approximately 80 per cent. of the world consumption of rubber is for motor tyres. In order to discover the general effects of the depression on rubber consumption, the absorption of rubber for purposes other than tyres must therefore be examined. Figures for this are not obtainable for all consuming countries; but for the U.S.A. reliable estimates have been made available by the Commercial Research Department of the Rubber Growers' Association. Absorption, outside the United States, in 1925 was 170,000 tons; in 1928, 240,000 tons; in 1929, 337,000 tons; in 1930, 339,000 tons; and in 1931, 324,000 tons.

The general uses of rubber at present only account for 20 per cent. of the total absorption. The entire consumption crisis in the rubber industry has been caused by the drop in U.S.A. motor output and in the replacement demand for tyres on cars already in use. The fall in output from 5,358,420 trucks in 1929 to 3,354,986 trucks in 1930 and 2,389,730 trucks in 1931, combined with the fall in replacement demand, has reduced the annual rate of the United States rubber absorption for tyres from 427,382 tons in the summer of 1929 to an annual rate of 283,170 tons in 1931. At the same time, the fall in tyre stocks has reduced the trade's current requirements, in terms of crude rubber, by some 25,000 tons.

During the slump, the capacity of the native for cheap production has been demonstrated beyond all expectation, and, if it were not for a revolution in European costs since 1929, all but the most efficient European producers would have been forced out of business. The present general non-tyre consumption of rubber, however, is very well maintained, and, once the depression passes, the tyre consumption should rise very rapidly. But unless some large new outlet is discovered the industry will remain uncomfortably dependent on motor car output.

Russian Exports of Salicylic Acid

THE recent importation of 440 lb. of acetyl salicylic acid into the United States from Russia in January of this year makes evident the fact that the Russian manufacture of salicylates is now on an export basis. This is the first importation of acetyl salicylic acid into the United States since 1929, when 112 lb. were received. There are reported to be two salicylic acid plants in Russia.

Compound Fertilisers in Granular Form

A New Product Developed in the United States

COMPOUND fertilisers in the form of cylindrical granules resembling smokeless powder are now being produced on a semi-manufacturing scale in the United States. According to an account of the experimental work leading to this development, given by Mr. B. G. Klugh, vice-president of Swann Research Inc., of Birmingham (Alabama), to the New York Section of the American Institute of Chemical Engineers (*Industrial and Engineering Chemistry*, February, 1932), the process consists fundamentally in extruding a homogenous paste through apertures of the desired diameter and subsequently cutting the rods into pieces of the desired length. It appears, however, that some difficulty was experienced in providing suitable machinery to effect this process. For instance, even in the production of the paste to be extruded, all types of mixers involving the principle of interacting blades or knives failed, as the salt paste, when approaching the extrudable degree of plasticity was found to develop such a tenacious toughness that no cutting mechanism could continue to cut through it by reasonable application of power.

The edge-runner type of mill in which scrapers are co-ordinated with muller roller was ultimately found to be the most successful type of mill for carrying out the required combination of operations. The functions to be performed in this mill consist in grinding the salts to a finely divided state, providing surface contact of the entire mass for intimate and progressive gas reactions, intimate admixture of the entire mass throughout the cycle and a final kneading of the mass to homogenous extrudable consistency. The effective weight of the mullers is of greater requirement in the grinding operation and is essentially limited in the kneading operation. Heavy rollers passing over the paste compress it to a point of forming hard cakes, thus destroying the required homogeneity for extrusion. This feature was corrected by developing a mill in which the muller rollers are mounted in individual independent suspension with selective counterweighting, whereby a change from heavy effective weights in the grinding stage is instantly effected to light weight for the kneading stage. Under this kneading action the alternate pressure and release cause alternate solution and reprecipitation of the salts with their associated solution, so that there is effected a final equilibrium between the infinitely fine particles of the combination of the salts and the solution with which they are bound together.

Processing the Fertiliser Paste

In the preparation of this paste the combination of the bases, acids and neutral components is effected simultaneously with the grinding, mixing and kneading operation. This effects substantial economy in the conversion cost of the ultimate product from the basic materials. For nitrogen and phosphorus compounds the cheapest raw materials at present available are ammonia and phosphoric acid. Both require fixation for use in fertilisers. The production of ammonium phosphate, either the mono-, di- or intermediate stages, involves comparatively expensive equipment of solution, neutralisation, evaporation, crystallisation and handling of relatively large quantities of mother liquors. The processing mill, therefore, has the pan, scrapers and muller mechanisms inclosed in a pressure-tight hood. The potash and other salts available as such are passed into the pan through valve-locked means, and the liquid phosphoric acid and gaseous ammonia passed into the pan in controlled proportions. The combination of the ammonia and phosphoric acid is effected simultaneously and co-ordinately with the grinding salts. The ammonium phosphate is thus precipitated in finely divided state on the progressively developed surfaces of the grinding salts. The combination is thus effected completely without solutions or any processing residues for re-treatment. The complete combination of the NH_3 and H_3PO_4 is effected up to di-ammonium phosphate in ten minutes where pressure is applied.

Dispersion of the heat of reaction and its use for evaporation of accompanying water is automatically effected through adjuncts developed in the design of this processing mill which is designed for one-ton batches. The mill will run continuously and the salts, acid and ammonia are charged into it simply with valves. The regulation of the selective counter-weighting for the two steps of grinding and kneading is effected by one valve. The unloading of the sticky, gummy paste from this mill appeared to be quite a problem at first, but there has been developed a vertical screw which moves down, automatically removes the complete charge in maintaining sealed relation with hood, and moves back in three minutes. Only one attendant is needed for two mills, each completing a cycle of operation every 40 minutes. The paste is delivered by means of this unloading screw directly into the hopper, from which the extrusion machine takes its feed automatically.

Extruding and Screening Operations

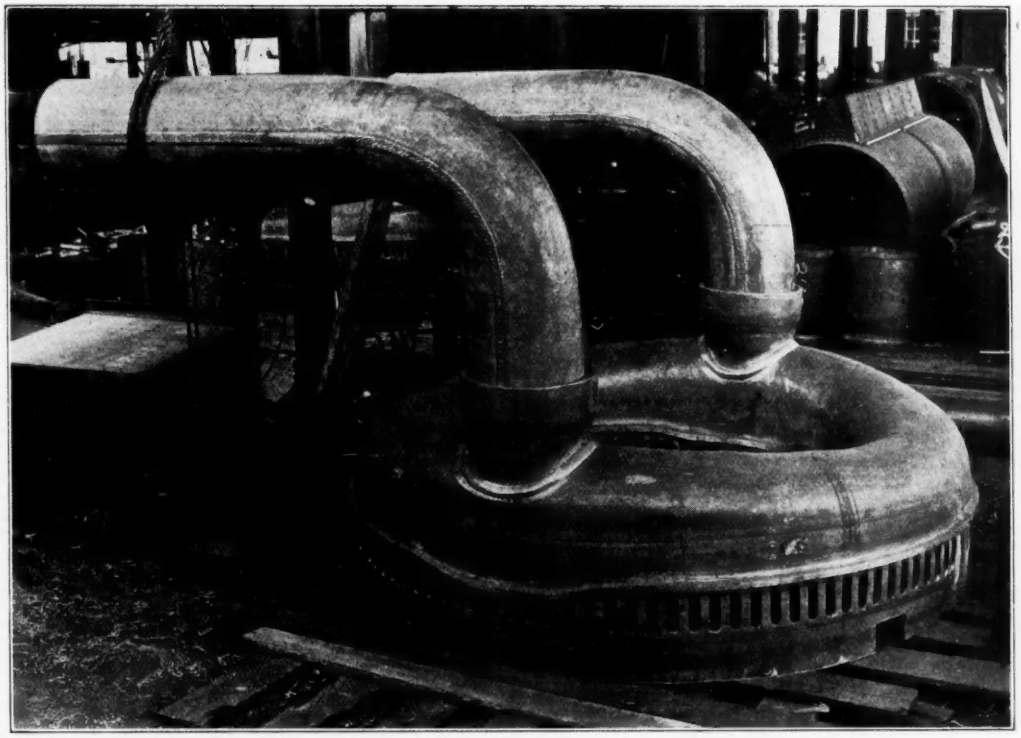
The extruding mechanism has required complete development in all details. Standard extrusion machines built to operate upon plastic materials are utterly useless on this character of materials. Six different machines have been built and from these all the fundamental principles and data for larger unit design have been developed. The pilot machine at present in operation has a capacity from 1,000 to 1,500 lb. per hour and is in daily use on production for field tests. The paste is fed by hand and the extruded material in long sections drops on a cooling and hardening conveyor. This treatment consists in blowing cold air through the screen conveyor carrying the freshly extruded sections, which hardens them sufficiently to withstand temporary storage, and to the drying and handling operation immediately following. The extrudes upon discharging contain about 6 per cent. water. The cooling and hardening conveyor reduces this to about 4 per cent. The drying operation consists primarily in circulating the sections through a cylindrical dryer. With product containing di-ammonium phosphate, the temperature of the extruded sections must be maintained below 70° C., which requires about 8 hours to dry them down to about 0.75 per cent. water. This drying time is not a serious burden, since no labour is required except the charging and discharging. It is proposed that a compartment cylindrical dryer be used, having a capacity of ten tons; hence, one dryer would be required for each 30 tons daily, or 10,000 tons annual capacity.

The next step consists in cutting and screening the sections to uniform lengths of about 1½ diameters, or ⅜ in. The screening involves complete separation of all the undersize product or fines, and the separation of the desired length (¼ in.) from the longer lengths of the same diameter. The overlengths pass off the screen into a cutting roll, which cuts them into exactly the desired lengths and returns them in circuit with the screen described. The fines are less than 3 per cent. of the total product and is returned to the processing mill for re-treatment.

The drying operation produces a surface having greater density than the interior. This is due to the fact that the water content, forming a saturated solution, must migrate to the surface as a solution. It is there that the water is evaporated, leaving the residual salts therefrom filling the microscopic interstices at the surface of each particle. Rolling and polishing removes all minute projections from the surface, and it is claimed that this is an important factor in the hygroscopic resistance of the product, since a perfectly smooth surface presents vastly less relative area for retention of atmospheric moisture, with its caking effect, than a surface with even minute projections and undulations.

Increased Hydroscopic Power

This new form of product is said to have at least twenty times the hygroscopic resistance of the corresponding mixture of crystalline salts. Where open piles of this product and corresponding crystalline salt mixtures are exposed to the same atmospheric condition the crystalline salts were caked hard in six days, whereas the extruded product described remained loose and showed only slight caking after 120 days. Shipment has been made in paper-lined bags, and in no case has there been any report other than that the product remained loose and free-flowing after several months. Production was started in January, 1930, and during the season of 1931 about 75,000 lb. of this drillable concentrated fertiliser was produced for use in field tests which were all reported to be favourable.



A TYPICAL EXAMPLE OF MODERN LEAD BURNING: BREECHIN PIPES FOR AN AMMONIA SATURATOR, CONSTRUCTED THROUGHOUT FROM CHEMICAL LEAD 1 IN. THICK. (R. MARSH AND CO.)

HOMOGENEOUSLY LEAD-LINED TANKS IN COURSE OF CONSTRUCTION AT THE WORKS OF R. MARSH AND CO., STRATFORD.

Lead as a Material of Construction for Chemical Plant

British Association of Chemists

Annual Dinner of the Manchester Section

THE annual dinner of the Manchester section of the British Association of Chemists was held at the Engineers' Club, Manchester, on Wednesday, March 16, when Mr. E. N. Marchant, chairman of the Section, presided.

In his opening remarks, Mr. Marchant alluded to the increasing influence of the Association. There was no direction in which its activities had not been developed in a surprising manner, and it was quite clear that the science of the future was going to take an increasing part in the direction and control of industry. Such an idea had been in the minds of those who had organised the Whitley Councils. It was the business of the Association to keep this question in mind since it had now, and would have in the future, increasing responsibility in the organisation of industry.

MR. C. B. WOODLEY, the general secretary of the Association, said that during the past year when the depression was at its worst, the Association had elected 220 new members. He had every reason to believe that they would do at least as well this year. Members might further be interested to know that since its inception the Unemployment Benefit Fund had paid out £7,500 in benefit. In these difficult times when even chemists who had occupied remunerative positions sometimes found it difficult to obtain suitable employment the fund has become of greater importance than ever.

Activities of Appointments' Bureau

Over one thousand appointments had been notified through the Appointments' Bureau during the past year, a large increase on previous figures, and the number of employers who approached the Bureau direct had increased in a surprising manner. It was being discovered that the Association could nearly always supply the right man for the right post, and it might be said in general that an employer could always obtain better results with much less trouble by application to the Bureau than by advertising. The Legal Aid Department also remained active, in spite of the fact that, fortunately, there had been no recent court cases.

DR. CALLAN, secretary of the Manchester Section of the Society of Chemical Industry, said he was extremely interested in the work of the Association. He thought that even more publicity regarding the economic aspect of the Association's work would result in securing as members a large number who were really ignorant of its work.

The Betterment of the Professional Chemist

MR. S. R. PRICE, president of the Association, said it was a great pleasure to be present at a dinner of a local section whose activity—evidenced by its increase in membership—was obviously being energetically and wisely directed. The Association existed for the betterment of the professional chemist, and they could judge from what they had heard that evening how successful its efforts had been. But that was not enough. They had to organise and prepare for the future. The depression would pass and times of prosperity were ahead. It was then that the profession of chemistry would come into its own, and the Association would have to see to it that the most was made of every opportunity.

MR. F. SCHOLEFIELD, past-president of the Association, welcomed the guests—Mr. Lester, chairman of the local Section of the Institute of Chemistry, and Dr. Callan, secretary of the local Section of the Society of Chemical Industry. It was also a pleasure and privilege to welcome Mr. W. E. Kay, whose pioneer work for the B.A.C. had done so much to place the Association in the place it occupied to-day. The most friendly relations existed between the Association and other societies. It could not be too widely known that the Association did not seek to compete with the Institute of Chemistry, as it had different functions, which could be carried out by no other society.

Butyl Alcohol and Butyric Acid in France

BUTYL alcohol is produced in France largely by the Distillerie des Deux Sevres. The Ketol Co. also undertook the manufacture of butyl alcohol and butyric acid. French butyric acid production by the several firms engaged in its manufacture is enough to supply the small domestic requirements.

Fish Meal from Wet Fish

An Outstanding Example of Good Engineering Design

EACH unit of the fish meal plant which is illustrated on page 277 by courtesy of Rose, Downs and Thompson, Ltd., of Hull, is capable of dealing with 25 tons of wet fish per day of 24 hours, and is an example of good engineering design in an industry which is now providing a considerable quantity of fish oils and fertilisers.

The wet fish delivered to this plant is first raised to the upper floor (Fig. 1) by means of an elevator. Here it is fed by hand into the hacker or reducing machine, from which it passes automatically to the sterilising apparatus. The latter takes the form of a steam-jacketed cylinder fitted internally with agitating and conveying gear, and is to be seen at the upper part of the drying apparatus (Fig. 2). This steriliser is operated on low pressure steam, in order that sterilisation may be effected at a low temperature, and suction branches are provided, complete with suction fan, for removing the vapours as rapidly as they are produced.

A Triple-Cylinder Dryer

The drying apparatus is of a 3-stage steam-jacketed tubular pattern, and each section consists of an inner tube fitted with a hollow central shaft provided with agitating and conveying gear similar to the steriliser. The hollow shafts serve for the passage of live steam to assist in the drying operation. Each section of the dryer is also provided with two large vapour outlets, by means of which an efficient suction fan carries off the moisture and vapours which are produced. Special means are provided to regulate the flow of steam to the drying tubes in order to control the percentage of moisture in the finished fish meal.

From the drying apparatus the meal falls automatically into an elevator, which delivers it to a disintegrator and thence to a screen. Tailings from the screen are returned to the disintegrator and re-ground along with new material from the dryer. If the meal is to be de-oiled it now passes on to a solvent extraction plant; alternatively, it is packed in sacks ready for transport.

Destruction of Vapours

The vapours produced during the sterilising and drying operations are led to a series of cataract condensers where they are condensed by cold water, and the condensate thus produced passes direct to the sewer. Non-condensible gases, which are present in small quantities, are ultimately passed to a furnace or incinerator where they are completely destroyed.

The advantages claimed for this plant are :—(1) The whole process is completely automatic from the time the fish is put into the reducing machine; (2) the consumption of power, steam and water are reduced to the minimum consistent with efficient working; (3) the offensive smells are thoroughly destroyed, avoiding the risk of complaint from the local sanitary authorities; (4) the fish meal produced by the plant is of high quality and excellent colour.

Photosynthesis of Sugar

SOME of the difficulties that have been surmounted, and others that remain to be overcome, in the photosynthesis of sugars in the laboratory were outlined by Professor E. C. C. Baly, at a joint meeting of local sections of the Society of Chemical Industry and the Institute of Chemistry, at Liverpool University, on March 10. Professor Baly said the process whereby the living plant was able to manufacture sugars from such simple materials as carbon-dioxide and water, with only the adventitious aid of sunlight, was a reaction of unique interest to many branches of science. The plant did, in one step, what the chemist could only partly imitate by long and weary stages, and one of the mysteries was that the energy derived from light by the plant was only a quarter of the total energy required for the synthesis of sugar. It was absolutely unknown whence came the remaining three-quarters of the necessary energy.

Carbon Dioxide in Sweden

SWEDEN'S output of carbon dioxide increased from 1,045 metric tons in 1926 to 1,244 tons in 1929. Solid carbon dioxide is produced by De Forenade Kolsyrefabrikernas Aktb., Stockholm.

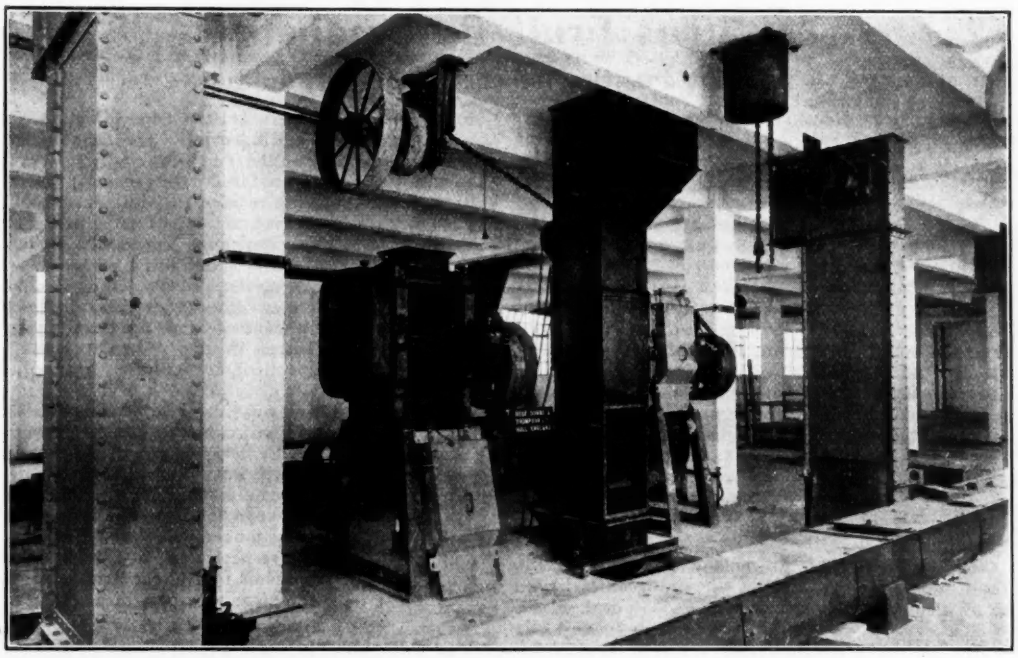


FIG. 1. THE UPPER FLOOR OF THE PLANT SHOWING THE "HACKERS" FOR BREAKING UP THE WET FISH PRIOR TO ENTERING THE STERILISING AND DRYING APPARATUS.

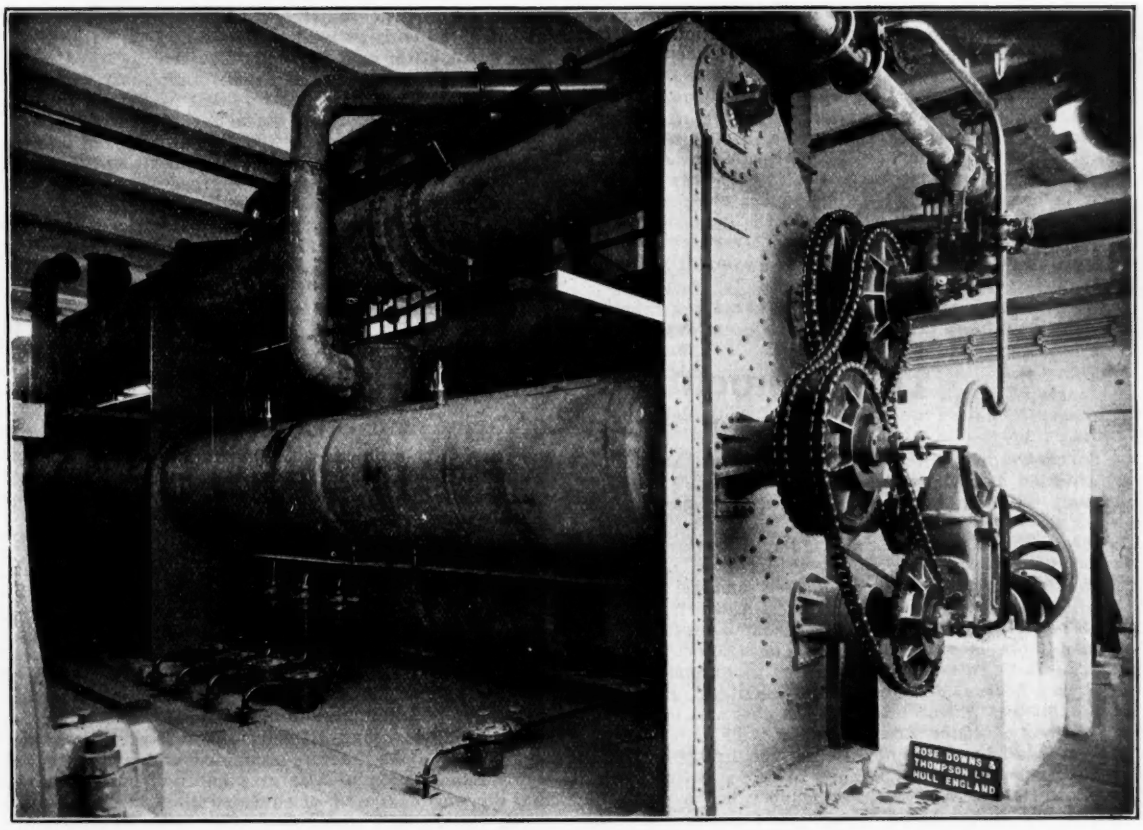


FIG. 2. ONE OF SIX STERILISING AND TRIPLE-CYLINDER DRYING UNITS, SHOWING DUCTS PROVIDED FOR REMOVING MOISTURE AND VAPOURS BY SUCTION FANS.

A Modern Plant for the Production of Fish Meal

This plant, by Rose, Downs and Thompson, Ltd., is described on page 276.

Citrus Fruit By-Products

Present Position of the Sicilian Industry

THE Sicilian citrus fruit industry has been labouring under difficulties for some time. Prices for fresh fruit have been so unremunerative that after the bumper crop of 1929-30, growers, heavily burdened by taxation, tended to neglect orchards, and, rather than cultivate choice varieties for export, sold their fruit for what it would bring for industrial purposes. Figures for the production of fresh fruit in 1931 are expected to show that the lemon crop was about 35 per cent. below the 404,544 tons produced in 1930. Production of oranges is about 20 per cent. below last season's figure of 294,335 tons.

According to a report on Italian essential oils and other citrus fruit by-products, published in *Commerce Reports* (United States Department of Commerce), the use of machines to express lemon oil is becoming increasingly prevalent. The machines have been so perfected and the quality of the machine-pressed oil is so improved that part of it may go into the sponge oil without being detected, and it is estimated that 50 to 60 per cent. of the lemon oil is now machine oil.

Bergamot Oil

The carry-over of essential oils at the beginning of the current season has been estimated by the trade as follows: Lemon oil, 350,000 kilos; bergamot oil, 80,000; orange oil, 23,000; and mandarin oil, 2,300. As regards bergamot oil, there is a considerable accumulation of stocks to be brought forward. Furthermore, linalyl acetate and synthetic bergamot oil, which recently have appeared in notable quantities on the world market, are formidable competitors to the natural oil and are used as substitutes to an increasing extent. As another adverse factor owing to the critical situation of citrate of lime production, there is little or no requirement for bergamot juice to produce citrate. The loss of the sale of the juice tends to increase heavily the cost of production of bergamot oil. The situation is confused further by the formation of the compulsory bergamot consortium in October, 1931. The organisation is not yet operating properly and the adversaries of the consortium state that so far it has served only to render business in bergamot oil more difficult and uncertain. According to the new regulations, producers must deposit all their oil with the consortium, but it is not yet clear whether the consortium will sell direct to foreign buyers or will operate through the exporters in Messina.

In Sicily the whole of the citrate of lime is marketed through the Camera Agrumaria at Messina. Producers deposit their output with the Camera against deposit warrants and receive an advance on the selling price. The Camera, in turn, after having taken care of the domestic citric acid industry, sells the citrate of lime to foreign buyers. At the close of the citrus year, producers receive the difference between the advance already made and the actual sales prices. Production of citrate of lime December, 1930 to November, 1931, amounted to 5,505 tons, as compared with 10,716 in 1929-30. During the past two or three years a radical change has occurred in the citrate of lime and citric acid industry owing to the rapid development of these products by the fermentation process. Whereas formerly world manufacturers of citric acid were dependent upon Sicily for supplies of citrate of lime, the citrate of lime obtained from the fermentation of sugar is offered now on European markets, with the result that the demand for Sicilian citrate of lime has become much less urgent and the Camera Agrumaria has been forced to reduce prices continually until the producers now claim that no margin of profit remains. Exports of citrate of lime declined from 2,284 tons in 1929 to 1,292 in 1930, of which Great Britain received 1,170 tons in 1929 and only 76 in 1930; France, 920 and 817, respectively; and Austria, 182 and 358. In the first nine months of 1931 Great Britain was the destination for 101 tons and France, 1,004, of a total of 1,167 tons.

Production of Citric Acid

Sicilian citric acid is marketed through a central sales office, the C.I.F.A.C., at Milan. The C.I.F.A.C. also markets fermentation citric acid made by the Société Tirlemontoise in Belgium, in which Italians have a financial interest. Production of citric acid in Italy in 1931 is recorded as 3,000 tons, as compared with 3,800 in 1930 and 4,000 in 1929. Italian exports of citric acid totalled 1,822 tons in 1930, declining from 2,804 tons in 1929. Great Britain's share declined from 594 tons in 1929 to 220 in 1930; that of France from 447 to 230 tons, of Germany from 402 to 215; Argentina, 222 to 199; and the Netherlands, 195 to 180. Spain took 129 tons in 1929 and 156 in 1930. Of the 1,350 tons exported in the first nine months of 1931, Great Britain received 432, France 215 and Spain 112.

The struggle between Sicilian citric acid and the synthetic product is more than ordinary trade competition. Unless Sicilian producers succeed in bringing their production costs down to the level of the synthetic product, we may witness the displacement of one more natural product by a synthetic substitute.

Developments in Glass Technology

The Effect of Surface Conditions on Strength

FOUR papers on the subject of glass manufacture and testing were presented at the joint meeting of the Society of Glass Technology with the Ceramic Society, held at Sheffield on February 24.

The strength of materials as affected by discontinuities and surface conditions was discussed by Professor F. C. Lea, of Sheffield University. In his introductory remarks, Professor Lea dealt with the different types of stress to which materials might be subjected, and the effects of repeated stresses as distinct from those of static stresses. The effects of discontinuity of form such as a cut, or milled groove, and of discontinuity of internal structure, were described. Here plasticity of materials played an important part and fortunately when the stress exceeded a certain amount, the materials used by the engineer flowed, thus reducing the stresses at sharp curves to finite values. The range of stress during cycles, might, however, be such that, although other parts of the element where the apparent calculated stress was the same as near to the discontinuity, and oo low to cause fracture, yet failure might occur comparative easily near to the discontinuity. Experiments carried out in the author's laboratories showed that under static stress, a groove or a thread did not of necessity weaken a specimen, some of which exhibited marked elongation. It was found, however, that the effect of a groove or a small hole or key way was to reduce very materially the safe range of repetition stress. Since glass was brittle, and not plastic, it might be expected that the full theoretical concentration of stress would occur at the slightest discontinuity.

Tensile Strength of Glass

Investigations on the tensile strength of glass were reported upon by E. J. Gooding, of the Rockware Glass Syndicate, Ltd., Greenford. The author described a new method of determining tensile strength, in which the specimen took the form of rod, with a maximum diameter of 3 mm. The glass was all obtained from tanks of white flint, and all specimens were thoroughly annealed after the central restriction was made. Continuous and discontinuous loading were tried, the breaking load and diameter of the rod on breakage were measured and the fracture examined under high magnification. Examination of a large number of specimens showed that the tensile strength of annealed glass specimens all made at the same time and receiving similar treatment, varied considerably, one of the factors associated with the variation being the type of fracture. Generally speaking, a smooth fracture was associated with a lower value for the tensile strength than one which was largely rough. Some 60 to 70 per cent. of the specimens broke with one type of fracture, associated with some of the highest values. The thickness of the specimen, the method of loading, the effect of tempera-

ture at which the restrictions were made; and the state of annealing were other factors tested. The relationship between tensile strength and thermal endurance was also discussed.

In his paper on the structure of sillimanite and related materials, Dr. W. H. Taylor, of the Physical Laboratories, Manchester University, gave an account of information gained by X-ray methods on the structures of sillimanite, cyanite and andalusite, the three naturally occurring forms of the compound Al_2SiO_5. The results of recent work by A. L. Roussin on the structure of porcelain were also described, the fibrous constituent of porcelain, called by Roussin "porcelainite" being now found to be neither sillimanite nor mullite. The presence of this substance was unsuspected until X-ray methods were applied, and nothing was yet known of its chemical composition.

Corrosion in Glass Melting Pots

Clay mixtures for glass melting pots with special reference to corrosion resisting properties was dealt with by Dr. J. H. Partridge, G. F. Adams, and J. R. Lait, of the Research Laboratories of the General Electric Co., Ltd., Wembley. In presenting the final part of these investigations on clay mixtures, Dr. Partridge spoke of the corrosion-resisting properties of the various clays available, the degree of solution in molten glass having been determined. The clays were made into small crucibles, and the quality of the glass obtained by their use was examined. It was found that the degree of corrosion of aluminous clays was less than that of the siliceous clays, when a lead-alkali-silica batch was used, the batch being more corrosive than the glass. Specimens which were corroded least had a white protective layer, consisting mainly of mullite between the glass and the refractory, whereas this was almost non-existent in the case of the more siliceous materials. In longer tests carried out at 1,300°, with a lime-soda-silica batch, it was found that the close-grained aluminous clays resisted to a greater extent than the siliceous ones, the structure of the clay being a very important factor in assessing the resistance. Generally speaking, the glass from the aluminous clays was more corroding than that melted in siliceous clays, the latter type of crucible giving the best quality glass.

The Leather Industry Outlook

More Optimism than a Year Ago

WHEN Great Britain went off the gold standard in September of last year, leather manufacturers experienced a miniature boom. The rush to purchase existing leather stocks enabled the tanners to clear their warehouses, but the sudden increase in buying was, in reality, merely the transference of stocks to the warehouse of the boot manufacturer. There was no concomitant increase in the consumption of leather.

The immediate effect of the fall in the international value of the pound led to an advance in the price of foreign hides. This, in itself, is advantageous to the tanner provided that the advance in price is not suddenly followed by a decrease. It must be especially remembered that making leather is a somewhat slow process; for example, it requires a minimum of about three months to produce a satisfactory piece of sole leather and as the price of the hide represents approximately 70 per cent. of the cost of the finished article, a steadily increasing cost of the raw material spells "Utopia" to the tanner.

The British tanners use considerable quantities of chestnut extracts, the chief suppliers being France, Italy and America. These extracts have, of course, advanced considerably in price and many leather manufacturers have been endeavouring to use other materials in their place. Chestnut extract is a somewhat acid material. The *pH* values of different supplies vary between 2.4 and 2.8, while other extracts, such as mimosa, have values of the order of *pH* 3 to 4. There is little doubt that the utility of chestnut is in no small measure due to its low *pH* value, and efforts are being made to stimulate them by treating other tanning extracts with organic acids such as formic acid. The exploitation of the chestnut market by such substitutes is in its infancy.

Utility of the "Non-tans"

For many years past, the purchase of vegetable tanning materials has been based purely on the amount of tannins as determined by the somewhat crude and empirical hide powder method of tannin analysis and little or no attention has been directed to the utility of the "non-tans," *i.e.*, those matters which are not absorbed by hide powder. It is noteworthy that there is a definite movement now to seek materials which contain higher proportions of these non-tans. The utility of the non-tans was admirably discussed, on purely theoretical grounds, by Dr. H. Phillips at a lecture at the Leathersellers' College on January 27 last, in which he showed that the non-tans pave the way for the penetration of the tans, preventing the tans from being prematurely fixed and at the same time enabling the tanner to get a well filled leather of high quality. It would seem, therefore, that the need of the leather industry at the moment is for a source of non-tans which can be added to the ordinary tan liquors in order to balance up the ratio of tans to non-tans. It might be added here that the obvious non-tan, sulphited cellulose, is not of much value in this connection.

Of the mechanical aids to tanning, a large number of ideas have been patented in order to speed up the production of sole leather, but many of them do not seem to have withstood the test of time. In the drying of leather a considerable amount of experimentation is in progress. A new machine has lately been put on the market in which the hides are stretched out on circular frames which revolve inside a chamber in which air is circulated. This rotation prevents the draining of the liquor in the hide to one edge and should enable a more uniform drying to occur. If this machine is successful, it may be that half the drying troubles of the tanner will be solved.

The Light Leather Section

In the light leather section, the chief activity is to try to capture the box calf and japanned chrome leather markets. This trade has been chiefly in the hands of German and American producers, but under the shelter of the tariff the chances of the British manufacturer of establishing himself are by no means remote. It is not true, as was stated in the House of Commons a short time ago, that the climatic conditions of this country are unfavourable to the production of patent or japanned leather. This type of leather has been made here for many years and it is to be hoped that the production will be considerably increased.

In all branches of the leather trade there has been a tendency to hasten up the depilation process. As is well known, hides and skins, after washing in water, are immersed in an alkaline bath in order to loosen the hair. A suspension of lime is the usual alkali while additions of sodium sulphide will materially shorten the time taken to loosen the hair. It would be quite possible to get rid of the hair in one or two hours by this means but the hide fibres, which go to make the leather, would not be in a suitable condition for tanning. The modern need for speeding up processes requires that more use shall be made of accelerators for the unhairing, and the use of sulphides is going to increase. One of the difficulties in using sodium sulphide is that it brings about a rather excessive amount of plumping or swelling of the hide. This swelling is due to the use of sodium salt and would not arise if calcium hydrosulphide were to be used as the source of sulphide. The calcium salt is, however, unobtainable commercially in a form and at a price which will enable it to compete with sodium sulphide, but its production might be worth the attention of the chemical manufacturer.

The outlook of the leather trade is certainly more optimistic than it was twelve months ago but its optimism is not violent; it is tempered with discretion. At the best of times, leather making must be considered as a speculative trade and it is to be regarded with satisfaction that the prospects of a general trade revival have not turned the heads of tanners. Development in the leather industry is a slow process. Unlike engineering, doubling the output in a tannery does not just mean doubling the number of pits, paddles or drums; it means making a new set of liquors and this means not only time but a tremendous outlay of capital.

United Kingdom Fourth Census of Production, 1930

Preliminary Report of the Chemicals, Dyestuffs and Drugs Trades

THE particulars for 1930 and 1924 given in this preliminary Report relate to returns received on schedules for the chemicals, dyestuffs and drugs trades. Detailed returns were not required from firms employing ten or fewer persons in 1930, and the particulars which follow, both for 1930 and for 1924 relate to firms employing more than ten persons on the average. In the 1924 census an aggregate of 2,233 persons was recorded on returns dealing with production carried on by not more than ten persons on the average in the year and on returns for Northern Ireland, or about 3 per cent. of the total recorded on all schedules for that year. The value of the gross output of these firms amounted to about £1,750,000. The figures for 1930, therefore, cover 572 establishments at which operatives were employed. Returns for 1930 are outstanding from establishments that employed, in 1924, about 800 persons, or about 1¼ per cent. of the total number recorded for that year by all firms employing more than ten persons.

The following table shows the values and, where recorded, the quantities of chemicals, drugs, etc., made for sale or for stock in 1930 and 1924 by firms that made returns:—

	1930.		1924.	
	Th. tons.	£'000.	Th. tons.	£'000.
Acetic acid	4·5	154	2·4	83
Hydrochloric acid (at 1·14 S.G.)	161·0	486	207·2	708
Sulphuric acid (as 100 per cent. acid)	467·2	1,574	605·8†	2,106
Nitric acid	6·5	119	8·0	186
Sulphate of alumina	49·2	222	79·6	572
Other aluminium compounds	36·1	442		
Ammonium carbonate and bicarbonate	4·7	105	3·7	120
Ammonium chloride (muriate)	9·7	174	8·5	237
Ammonium sulphate	351·7	2,120	41·0	498
Other ammonium compounds (including anhydrous ammonia)	16·3	288	24·4	348
Bleaching materials (bleaching powder, peroxides, etc.)	106·2	959	94·4	1,091
	Th. gal.		Th. gal.	
Carbonic acid gas, compressed	69·9	4	492·6	26
	Th. lbs.		Th. lbs.	
Anthracene (excluding anthracene oil)	6,828	86	11,004	136
	Th. cwts.		Th. cwts.	
Benzol	7·4	3	19·7	11
Carbolic acid, crude (in terms of 60's)	Th. gal.		Th. gal.	
	9,583	728	11,440	859
	1,465	120		
	Th. cwts.			289
Carbolic acid, crystal	46·8	140		
Naphthalene (excluding naphthalene oil)	Th. cwts.		Th. cwts.	
	196·9	59	122·6	54
Tar oil, creosote oil, etc.	Th. gal.		Th. gal.	
	51,303	730	47,465	1,510
Toluol	342	33	305	26
	Th. cwts.		Th. cwts.	
Formaldehyde	48·5	71	11·4	30
	Th. tons		Th. tons	
Potassium chloride (muriate)	1·3	13	0·6	4
	Th. cwts.		Th. cwts.	
Potassium iodide	2·4	218	2·1	196
	Th. tons		Th. tons	
Potassium sulphate	1·9	17	0·6	6
	Th. cwts.	£'000	Th. cwts.	£'000
Potassium chromate and bichromate	25·6	47	109·4	218
Other potassium compounds	67·2	104		
Sodium carbonate (including bicarbonate, ash and crystals) and caustic soda	934·0	6,213	1,488·8	9,773
Other sodium compounds	175·7	1,430		
	Th. lbs.			
Technical fine chemicals	4,481	228		
Research chemicals	2,134	146		
Synthetic perfumery chemicals and isolates	581	80		

† At 1.7 specific gravity.

Dye intermediates made from coal tar primary products	Th. cwts. 257·1	921	Th. cwts. 203·7	1,189
Finished dyestuffs obtained from coal tar	353·9	2,738	373·8	3,932
Extracts for dyeing	66·2	97	77·9	153
Extracts for tanning	840·7	590	1335·9	810
	Th. lbs.		Th. lbs.	
Essential oils	256·5	142	477·2	130
Finishing materials for textile trades, other than oils	..	87	..	176
Essences and colours for confectionery	..	896	..	460
Boiler compositions and disincrustants	..	98	..	251

The aggregate value of the products specified in the tables amounted in 1930 to only £6,369,000, or about 13 per cent. of the total value of the principal products of these trades. This proportion is too small to provide a satisfactory indication of the general movement of prices of chemical products between 1924 and 1930. It should be noted that, in each year, considerably more than one-half of the total value of chemicals, etc., represented either goods of which quantities were not recorded (principally medicinal preparations) or general grouping (*e.g.*, "other" acids, soda compounds, etc.) of goods of different kinds and prices.

The particulars shown represent only the quantities recorded on schedules for the chemicals, dyestuffs and drugs trades, and for some products the figures given probably fall short of the total production. Such information as is at present available regarding the total production of ammonium sulphate is given in the Report on the fertiliser, disinfectant, glue and allied trades. The total output of sulphuric acid returned by trades on which reports for 1930 have already been published was 729,300 tons, in terms of 100 per cent. acid, of which 145,100 tons were recorded on schedules for trades other than the chemical, dyestuffs and drugs trades. The total make of sulphuric acid reported by all firms in the United Kingdom for the year 1924 was 1,103,000 tons at a specific gravity of 1.7, or about 850,000 tons in terms of 100 per cent. acid, of which 619,000 tons were recorded on schedules for the chemicals trades. The total quantity of copper sulphate recorded by all firms in 1924 was 38,000 tons; for 1930 the total quantity recorded, so far as particulars are at present available, was 34,500 tons.

The principal aggregate figures revealed by the censuses for 1930 and 1924 are summarised in the following table:—

Particulars.	Unit.	1930.	1924.
Value of goods made and work done (gross output)	£'000	50,665	54,472
Cost of materials used	,,	25,546	29,765
Net output	,,	25,111	24,696
Average number of persons employed	No.	70,618	67,012
Net output per person	£	356	369
Mechanical power available:—			
Prime movers	H.P.	387,387	165,422
Electric motors driven by purchased electricity	,,	145,842	80,545

Presentation of the Duddell Medal

THE annual meeting of the Physical Society was held on March 18 at the Imperial College of Science and Technology, South Kensington, Professor Sir Arthur Eddington, F.R.S., the president, in the chair. After the usual business of the annual meeting, the chairman presented the Duddell Medal for 1931 to Professor C. T. R. Wilson, F.R.S., Jacksonian Professor of Natural Philosophy at Cambridge, for his contributions to physical science. Professor Wilson briefly acknowledged the presentation. Professor A. O. Rankine, D.Sc., was elected president, succeeding Professor Eddington, whose name was added to the list of ex-presidential vice-presidents; Mr. T. Smith, M.A., was elected a vice-president in place of Professor Rankine; the secretaries, foreign secretaries, treasurer and librarian were re-elected; and Professors J. A. Crowther, D.Sc., H. R. Robinson, F.R.S., and G. F. J. Temple, D.Sc., were new members elected to the council.

Forest Products

Exploitation in the French Colonies

SPEAKING on forest products at the recent International Wood and Sylviculture Congress held in Paris, Dr. Dupont, of the French Pine Institute, said that resinous trees are rather rare in the forests of the French colonies. The pines are found only in very small quantities in North Morocco and Algeria; there are considerable pine forests in Indo-China, but they are inaccessible for commercial exploitation. Attempts have been made to work these forests, and by the usual French methods of production, a "gemme" is obtained from which very satisfactory rosin and turpentine can be produced. Bearing in mind that certain pine forests in India are being exploited for less satisfactory products, it seems that there is no reason why the Indo-China forests should not be made more accessible for commercial enterprise.

Copals for the Varnish Trade

Apart from the pines, certain other forest trees are already utilised and the products therefrom exported by the natives. There is the thuja, forests of which cover the western slopes of the Atlas mountains, and from which, by very rough and ready methods, sandarac resin is obtained. The Forests and Water Administration has now regulated the collection of this resin, as it is found that by methodical treatment, an increase in the yield of resin can be obtained as well as conservation of the forests. With regard to copals, so valued in the varnish trade, quantities are collected from trees in Madagascar (Madagascar copal) and on the western side of Africa (Congo and Angola copals), but the varieties most sought after are the fossil copals found in the soil of old forest areas. Shellac is collected from trees in the Indies and Annam. The cedars, which cover extensive forests of the middle Atlas, do not yield a fluid resin, but some manufacturers produce cedar wood spirit by steam distillation of the sawdust, for use in medicine and veterinary work. This volatile oil is a mixture of sesquiterpenes similar to cadinene, the chief constituent of oil of cade. There is also the "okoumé," which freely secretes a resin collected by the natives for making torches.

According to Dr. Dupont this resin contains phellandrene and a solid non-acid resin, assumed to be a mixture of amyrines. If greater care was exercised in its collection, it should be possible to export it at a good price.

In Morocco, the cork oak, thuja and wild pear furnish the best charcoal, while that from cedar is much lighter and friable. Morocco alone consumes some 120,000 tons of charcoal per annum, while Indo-China is a similarly large user. A considerable outlet for wood charcoal is in the production of gas in colonies where petrol is high in price. It would appear that sufficient efforts have not been made in this direction. The subject has been taken up at the French Pine Institute, where it has been found that the so-called red charcoal is the most satisfactory. This charcoal is prepared by heating the wood to only 250-280° C. By this or similar methods, it should be possible to furnish an almost unlimited supply of charcoal, and thus help in the economic life of the colonies.

Wood Distillation Products

As far as is known, the wood distillation industry has developed but very little in the French Colonies. Products obtained, such as methyl alcohol and pyroligneous acid are not much used in the Colonies, although in Cochin-China the acid produced from one plant is used in the rubber industry. Recently introduced methods for wood preservation, however, involve the use of pyroligneous liquors, and as creosote is scarce in these districts, the increased production of pyroligneous liquor should furnish a valuable impregnating material, and thus assist in the mutual development of two industries concerned. Wood tar already has many applications in the French Colonies.

In Morocco there are two types of commercial tars (a) a fluid tar (gratane er-relik) obtained from the cedar, and (b) a thick tar (gratane er-relid) obtained from the thuja. The cedar wood tar has the appearance, and many of the properties of cade oil, so much so, that it is used in native pharmacy. This tar is obtained by the natives who distill the wood from stacks of old oily stumps. The yield and quality could both be improved by distillation from retorts. As a rule, the yield of tar is about 14 per cent., but as the carbon is poor, and the pyroligneous liquor weak, the industry remains undeveloped. Thuja tar has also several applications, more particularly for the impregnation of cloth. There should be possibilities for expansion in the production of medicinal wood tars, but as their use is rather limited, the only other outlet would be for road work, in which case, price, as compared with coal tar, would be a governing factor.

The Development of Artificial Silk

By Dr. C. J. J. Fox, F.I.C.

QUANTITATIVELY, the growth the artificial silk industry has continued satisfactorily in spite of the unparalleled world-wide depression of the past few years. With the exception of 1930, world output, and British output, have increased steadily year by year, and it is now more than 200,000 tons, and five times what it was ten years ago. Quantitatively also, products are to-day better than ever before, and this is attributable to the close attention given to improving and perfecting every step in processing from the first stage of preparing the primary raw materials onwards. In this industry, more than in almost any other, controlled uniformity is the primary essential of success.

The viscose process continues to hold its own as the principal method, and to-day it accounts for as high a percentage as ever, over 85 per cent. of the world's total output. This overwhelming predominance is due not merely to the unrivalled cheapness of its primary raw materials, wood pulp, caustic soda and carbon bisulphide, which makes by-product recovery economically not essential, even if it may be desirable for other reasons, but it is due also to the exceptional scientific, industrial and commercial skill that has been devoted to its development. In its early days the quality of its products was nothing like as good as it is to-day; but prices were then very remunerative, so that it was feasible to buy experience and accumulate skill and wisdom in very advantageous conditions.

Newcomers to the industry, during recent years, have had to compete in world-wide adverse conditions against very high quality and at barely remunerative prices. They have found it an uphill struggle, and many have failed to survive.

Technically, however, it has been a period of great advances in scientific knowledge, especially in the field of colloid chemistry and X-ray analysis. There has been a steady improvement of quality in the primary cellulose raw material of the viscose industry, bisulphite wood pulp made from spruce. A special grade of pulp is used, and it is a small portion, not exceeding three to five per cent, of the whole output of bisulphite pulp for the paper industry.

Modern researches, reinforced by the results of studies by X-ray analysis, have indicated that high quality in the cellulose of the pulp is correlated with large size in the micelle, the primary unit of cellulose in the fibre. The micelle consists of bundles of chains of alternating dextrose residues and oxygen atoms. Careful processing apparently enables micelle size, and high quality consequent thereon, to be conserved in the pulp. In the silk mill the mercerising and sulphiding of the pulp, and the preparation, ripening and spinning of the viscose dispersion therefrom, are to-day more precisely controlled than ever before; the proportion of grade A silk obtainable is almost entirely dependent upon this skilful manipulation of the independent variables of the process as a whole.

X-ray analysis indicates that the mechanical qualities of a filament, such as elasticity, tensile strength and so on, are related to the orientation of the micelles in the filament. With maximum ordering, amounting to close packing, tensile

strength is at a maximum and elasticity at a minimum, whereas with random ordering the reverse is true. It is obvious that the practical optimum must be some intermediate degree of ordering, and this is the explanation of why the high tensile strengths obtainable with, *e.g.*, the Lilienfield process, are accompanied by lower elasticities. The contact action of the spinnerette combined with the tension on the filament during the time of congealing as the viscose exudes from the spinnerette into the setting bath, is obviously a dominant factor in determining orientation of micelles; and it is doubtless one of the causes of the high excellence of silk made by the "stretch spinning" process which has been so much employed in the manufacture of cuprammonium silk. Modern viscose spinning gives the same control of micelle orientation by adjusting the concentrations of the setting baths and the tensions on the filaments. In natural fibres orientation is often spiral, and their non-creasing qualities are probably related thereto. In stretched metal wires the micelles of the cores are more strongly orientated than those at the surfaces, whereas in artificial silk it is the other way about. Dr. H. Mark, of Ludwigshafen, who has been primarily instrumental in establishing these conclusions has made an artificial silk with a well orientated core and an unoriented surface, (as for stretched metal wire) and he found, as he expected to find, that it had very good mechanical qualities, and also resistance to creasing. At present the method of doing this is purely academic, and much too complicated to be commercially profitable, but it is clearly a great advance that it should be known so clearly what the goal is.

The Chardonnet Process

Collodium, nitro or Chardonnet silk and acetate silk are made by dry spinning methods, and the very high output per spinnerette of the dry spinning process is the great initial advantage of these processes. The Chardonnet process uses alcohol ether as the dispersing agent, and its recovery has always been less perfect than the recovery of the acetone dispersing agent used in the acetate process, which is nowadays very satisfactory indeed. Chardonnet silk, spun as cellulose nitrate, is always reverted to cellulose, for which J. W. Swan's original method, using sodium sulphide, is still employed, so that it competes in the same class with cuprammonium and viscose silks, which are, of course, also reverted cellulose: whereas acetate silk is marketed as the cellulose acetate, and it has a merit of being different and complementary to the reverted celluloses, notably in respect of its reactions to moisture and dyes. It is evident that the special qualities of acetate silk ensure for it a special market of its own, which is not so much competitive as complementary to that of the other three silks, reverted celluloses, and its future is certainly likely to be determined by that fact; its output has grown steadily and remained at about 6 to 7 per cent. of the expanding world production.

Progress in the Fermentation Industry

Some Recent Problems Reviewed

THE fermentation industry, by which is meant that section of the industry devoted to the brewing of beer, progresses somewhat gradually in comparison with other branches of industry, for brewing is a complicated process depending on the activity of yeast cells and any changes made must be carefully considered beforehand. Within recent years, however, owing to new burdens of taxation which the industry has been called upon to bear there has, of necessity, been a change in the type of beer produced. If the consumer is to have his beer at a reasonable price notwithstanding the ever increasing load of taxation, then he is obliged to accept weaker beers. Weaker beers mean less alcohol and less natural preservative in the beer, and it has been this reduction in alcohol content which has created a multitude of new problems for the brewers and their scientific advisers.

Wort Cooling Problems

Difficult points have also arisen in connection with such matters as the refrigeration of wort, fermentation, treatment and storage of yeast, the filtration of air, the cleansing of plant, the manufacture of malt, use of different types of sugars, etc. Many of these problems have had to be approached from first principles and solved as occasion has demanded. The question of wort refrigeration is of considerable interest. When boiling wort is turned away from the copper it has to be cooled rapidly to normal temperature before the yeast can be added, and at this stage wort is in its most vulnerable condition. Charged with hops and sugars rich in protein matter and as yet unprotected by the addition of yeast, the wort is liable to become contaminated very easily. This contamination may be due to impure air in the room, or some other source of infection. Years ago in the days of high gravity worts, cooling was carried out on very large surface shallow cooling pans whereby the wort was obliged to travel for great distances and cooled by ordinary atmospheric air. With changing conditions, however, this method was found to be rather dangerous so that horizontal type refrigerators have been installed. In this cooling system the length of travel was very much curtailed, whilst the cooling surface was increased. Later this method fell into disfavour and vertical type refrigerators replaced those of horizontal design with a view to reducing to a minimum the surface of wort exposed to contamination by impurities in the air.

Although vertical refrigerators are still in use in many breweries, a new system of refrigeration is now being favoured. This new method, sometimes called "enclosed refrigeration," is such that only sterilised and filtered air (if used at all) is admitted to the closed system and the wort is cooled by a current of cold water flowing in the opposite direction on the alternate sides of grooved plates. Such a cooling system rules out all possibility of accidental air contamination and, provided that the plant is kept scrupulously clean, is proving very successful.

Air Filtration Problems

In the production of sterile air many changes have taken place in the design of plant. A variety of types of air filter have been produced from wet charcoal screens, cotton wool screens, glycerine drums, kapoc screens, and contact chambers containing antiseptics, down to corrugated oiled plate types. The problem of air filtration does not yet seem to be fully understood by the makers of such plant. When a brewer asks for "pure air" he means bacteriologically pure air, and not the sort of "pure air" understood by those who ventilate public buildings. This question of air purification is therefore a matter of ever increasing importance to the brewing industry as a whole and requires very careful study.

Coming to problems connected with yeast cold storage for yeast during its resting periods in an atmosphere of pure air is now generally recognised as a necessity and very considerable strides have been made in recent years in this matter. Cold air is in many cases displacing brine pipes as a cooling medium. Cask washing has also been greatly improved and casks are now washed mechanically on a large scale and in many cases dried with sterilised air.

Beer mains and fermenting vessels are still built mainly of copper, for this metal has many advantages for the brewers. It is fairly cheap, easily worked, capable of being scoured or polished bright and it also possesses a not-unreasonable scrap value. Little has been done with a view to replacing copper in the brewery by other metals or alloys and yet, the time seems to be approaching when a new metal will be required. Nickel and aluminium have both been tested and "have been found wanting." Stainless steel, which would be an excellent material for the purpose in hand, cannot yet be produced in the form required or at anything near the price paid for copper. No doubt this matter will receive attention in the near future by manufacturers of alloys and the stainless steels.

General Treatment of Beer

With the ever increasing popularity of bottled beers problems have fallen thick upon those responsible for its bottling and general treatment. Brewers operating bottling departments on a large scale have to-day to tackle questions

of bottle washing, filling, crowning or screw stoppering, pasteurising, labelling, transport, etc., on a scale undreamed of some years ago. Machines have now been perfected whereby vast quantities of bottles are washed and sterilised, filled, crowned and labelled in one continuous operation often at rates of 6,000 bottles per hour. Glass-lined steel tanks have come into favour for cold storage of beers intended for bottling, and road tanks of aluminium or glass-lined steel are in use for transport of beers to outside bottling departments. Many changes have also taken place in methods of cold production and in many instances ammonia has replaced CO_2 as a refrigerating medium. Brine or air-cooled mains have been provided for the passage of beer from cold stores to bottling machines or filters to ensure that no increase of temperature occurs between such points. Ingenious machines have also been evolved to chill the beer rapidly before it passes into cold store, and new types of beer filters have been designed so that beer passing into the bottles may be sterile. The question of pasteurisation is another point which has been extensively studied and it is now possible to pasteurise beer either in bulk or in bottle at a speed which will compete with the output of the bottling units

The Institute of Brewing Research Department, financed by the brewing companies, carries out valuable and highly technical research on a variety of subjects. The production and cultivation of new types of Empire barley to replace foreign material, the raising of new varieties of English hops to replace those at present being imported, problems of yeast cultivation and growth and many other matters of vital importance to the fermentation industry are now being studied. Modern bacteriology owes much to the early activities of the fermentation industry and the work of the Institute of Brewing in this connection is a credit to those by whom it is so ably supported. Whilst much has been accomplished by the brewers themselves, there remains much to be done in the future. For instance, there are many problems such as water treatment, hydrogen ion concentration in regard to the brewing process, sterility of plant and the production of very long life brilliant bottled beers, which have yet to be solved.

Safety in Handling Liquid Chemicals

Simple Devices to avoid Hazards

THE handling of liquids which are delivered to users works in drums, casks or carboys, should present no difficulties or danger if the equipment here illustrated is adopted.

The "Monopol" self-priming syphon (Figs. 1 and 2) is made in a range of sizes and in materials to suit all liquids. It is simple in construction, and easy to prime. The syphon is merely put into the vessel to be emptied, the tap opened, rubber bell pushed in, tap closed, and bell pulled out. The vacuum thus produced draws the liquid into the delivery arm of the syphon and the liquid can then be drawn off at will. It will be noticed that the liquid which is being handled does not come into contact with the rubber part of equipment.

The "Culminex" self-priming syphon (Figs. 3 and 4) is not primed with a rubber cup but with a suction arrangement placed at the top part of the delivery tube. This syphon is therefore especially suitable for transferring very corrosive liquids from carboys and drums as the very last drop of acid in the vessel can be drawn out. In use, priming is effcted by first closing the tap at the point of delivery and then turning the air tap on the priming device into a diagonal position. The rubber ball is then compressed, the tap is returned to its original position and the pressure on the ball is released. After pressing the ball and releasing it about eight times the liquid will rise to the glass float and the syphon can then be put into operation.

The "Express" cask and drum emptier (Fig. 5) is a very solid iron apparatus which is inserted into the bung hole and fastened with a strong screw which makes it air tight, and is specially designed for use in emptying barrels or drums of heavy oil and other liquids of similar density, which cannot be emptied by the "Monopol" or "Culminex" syphons or even by a pump. It can be attached or removed from wood or iron casks in a few moments, and the casks are emptied in an exceptionally short time, even with the thickest liquids, or about as fast again as by pumping. The liquid will not be affected, as the apparatus scarcely touches it. This device is also unrivalled for drawing samples in place of plunge syphons, and for emptying casks which are too full.

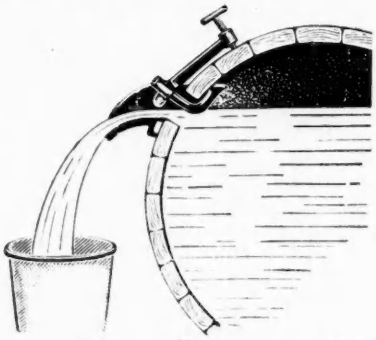


FIG. 5.

FIG. 1.

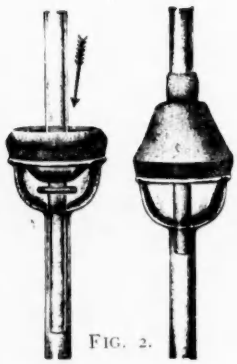


FIG. 2.

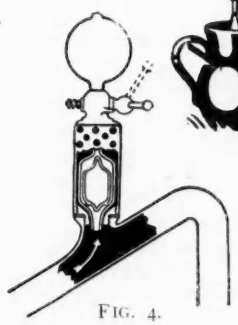


FIG. 4.

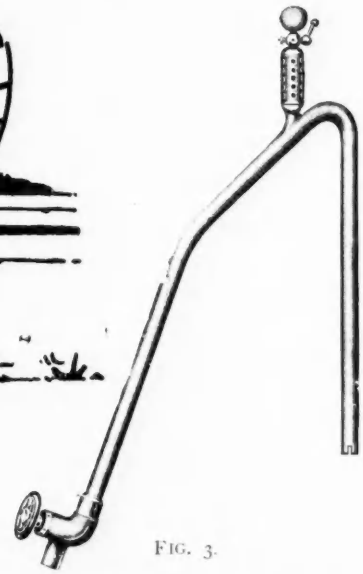


FIG. 3.

SOME SIMPLE DEVICES FOR HANDLING LIQUID CHEMICALS (HARRY HEYMANN, LTD.).

Chemical Matters in Parliament

Beet Sugar Industry

On Thursday, March 10, Sir Nicholas Grattan-Doyle (Newcastle-upon-Tyne, North) asked the Chancellor of the Exchequer what was the aggregate amount of loan money to beet-sugar factories still outstanding under the Trade Facilities Act; and whether he would consider the advisability of taking steps to provide for the repayment of this amount out of the profits made by the beet-sugar industry before the conclusion of the subsidy period?

Mr. Chamberlain: Out of £2,215,000 guaranteed to beet-sugar companies under these Acts, roughly £900,000 is due to be repaid to the lenders by instalments ending in 1938; and roughly £400,000 is due to the Exchequer in respect of payments made under the Treasury guarantees. Payment of the former amount cannot be accelerated and recoupment of the latter will be required in the normal course as and when the companies are in a position to discharge their debt.

Output of Raw and White Sugar

On Monday, March 21 Lieut.-Colonel Sir Frederick Hall (Camberwell, Dulwich) asked the Minister of Agriculture how many of the beet sugar factories now operating in Great Britain produce raw and white sugar, respectively; what was the total output of raw and white sugar from British beet during the last season; and how the proportion of raw to white output for that season compares with 1926-27?

The Minister of Agriculture (Sir John Gilmour): Of the 18 beet sugar factories operating in Great Britain in 1931-32 season, seven produced only raw sugar, nine produced only white sugar (exclusive of small quantities of after-product sugar of lower polarisations) and two produced both raw and white sugar. The total production of beet sugar in that season was 251,400 tons, including 139,000 tons of raw sugar and 112,100 tons of white sugar. The output of raw sugar in 1926-27 and 1931-32 represented 11.7 per cent. and 55.4 per cent. of the total quantities of sugar produced in those seasons respectively.

Impartial Inquiry into the Beet Sugar Scheme

On Monday, March 21, Mr. Groves (West Ham, Stratford) asked the Minister of Agriculture whether, in view of the fact that it is stated in the foreword to the report on the Sugar Beet Industry at Home and Abroad, recently published by his Department, that this was prepared by two representatives of the industry itself and an official of the Ministry of Agriculture, he will consider the desirability of causing an impartial inquiry to be made at at early date into the whole British sugar beet scheme on which future policy may be based at the conclusion of the subsidy period.

Sir J. Gilmour: I will bear in mind the hon. Member's suggestion

Turpentine and Industrial Diseases

Report of Departmental Committee

A Departmental Committee was appointed by the Home Secretary in November, 1930, to inquire and report whether the schedule of industrial diseases to which section 43 of the Workmen's Compensation Act, 1925, applies, can properly be extended to include poisoning by turpentine. The question of amending the description of the disease at present described as "dope poisoning (that is, poisoning by any substance used as, or in conjunction with, a solvent for acetate of cellulose) or its sequelæ" was also referred to the Committee during the course of their sittings.

After hearing the medical and other evidence submitted on behalf of the employer's associations and trade unions concerned, the Committee report that no case has been made out for adding poisoning by turpentine to the schedule of industrial diseases under the Workmen's Compensation Act, 1925. On the question of dope poisoning, they report that they have come to the conclusion that it would not be right, on the evidence at present available, to add to the schedule poisoning by any particular substance used as, or in conjunction with, a solvent for nitro-cellulose, or poisoning by such solvents generally. They also consider that the item "dope poisoning" in the schedule has ceased to serve any useful purpose, and is in fact a source of confusion.

Cooper, McDougall and Robertson

Sir Richard Cooper on the Effect of Tariffs

Presiding at the twelfth annual meeting of Cooper, McDougall and Robertson, Ltd., on March 16, Sir Richard Cooper said the company's business, in common with that of most other concerns with a world-wide trade, had been affected by the great industrial and financial upheaval. The company's total loss on exchanges during the year, and additional exchange reserve to cover the depreciated value of liquid assets abroad, total £143,796, or 63 per cent. of the trading profit. The additional reserve in this connection had been provided out of the profits earned. The loss involved was equivalent to 17½ per cent. on the issued ordinary shares.

The abandonment of the gold standard, with its consequent depreciation of the pound sterling had necessarily increased prices of certain raw materials, which the company used and which are not produced in this country. The imposition of the new 10 per cent. duty on many raw materials was also a serious blow to their business.

It was difficult to understand how a heavy tax on imported raw materials could assist this policy now recognised to be vital to the preservation of a prosperous Britain. This new tax on imported raw materials was nominally 10 per cent.; in practice it would often be much greater if it was levied on the official market price ruling in Britain. The company bought large quantities of imported materials at prices substantially below the official market prices ruling in London. On one raw material, which the Empire did not supply to this market, they would, on the aforementioned basis, and because of advantageous buying, pay an import duty equal to 17 per cent. of its cost to them. A careful estimate had been made of the actual cost to the company of this 10 per cent. tax on imported materials, taking last year's figures of consumption as a basis. The cost was equivalent to an additional income-tax on last year's audited profits of 2s. in the pound; and that was on a business owning five factories in this country, the production of which was exported to the extent of 75 per cent. He realised, however, that the reversal of the fiscal system of this great commercial country was a very difficult operation, and must involve some considerable time before a fair and equitable basis of treatment of all industries can be assured.

The Institute of Chemistry

Annual Meeting of the Bristol Section

The eleventh annual meeting of the Bristol Section of the Institute of Chemistry was held at Bristol University last week. Mr. F. Southerden presided and presented certificates of associateship to Dr. F. H. Meek (Plymouth), Mr. F. E. Neal (Shepton Mallett) and Mr. L. E. Hockin (Bristol).

The Chairman gave an address on "Through the Public Eye," in which he submitted that what the public saw as chemistry showed a grasp of the essential feature in an endeavour to understand of what things are made and to produce new things. As regards professional chemists, it would be in the public interest, for certain purposes, to close their ranks. A perusal of the register of the Institute showed that what may be called chemists-in-fact worked largely behind the scenes, hidden from the public view, and he suggested that it would be well for chemists more generally to take some active part in public work.

The address was commented on by Drs. Vanstone and Monkhouse and Messrs. Russell and Littlefield, the latter proposing the vote of thanks to Mr. Southerden for his address and for his admirable chairmanship of the section during the past two years.

The officers elected for the ensuing session were: Committee, E. Russell, R. D. Littlefield, Dr. E. Vanstone, E. Lewis and Dr. R. C. Menzies; auditors, Dr. H. F. Dean and A. E. Jones; hon. secretary and treasurer, A. W. M. Wintle; district member of council, E. Russell; district benevolent fund representative, A. W. M. Wintle.

Votes of thanks were passed to Mr. Southerden and Professor W. E. Garner, the retiring members of committee, and to the university authorities for the facilities granted for the meetings, with a warm expression of sympathy to Professor Garner in his recent accident.

Chemical Industry Lawn Tennis Tournament

Enter Now for "The Chemical Age" Silver Cup

THE chemical industry numbers in its ranks many thousands of lawn tennis enthusiasts, many of whom, since the first Chemical Industry Lawn Tennis Tournament organised by THE CHEMICAL AGE last year, have been looking forward with interest to the announcement of the second annual tournament. Inspired by the success of the first contest, we have arranged to run this year's competition on similar lines, and in order to allow time for the playing off of the various rounds, it is desirable that entries should be sent in as early as possible, so that the draw may be completed immediately after the closing date. An entry form appears below, and entrants are reminded that the last day for entries is May 2.

The tournament is limited to men's doubles and is open to all engaged in any capacity in the chemical industry throughout the country. Country members of the industry are particularly invited to compete. Last year there was a fair representation from the provinces, but this year we hope to see a much larger entry outside London. For all the earlier rounds of the tournament, the country will be divided into areas, so that opposing pairs may obviate the inconvenience of travelling considerable distances and may meet each other as near home as possible.

The appended rules show how the tournament will be conducted, but there are some points that might be emphasised. It is desired to make the contest as wide as possible, and there will be no entrance fees. At the same time, it is essentially a chemical industry tournament, and every competitor must be engaged in the chemical industry, either as a principal or a member of the staff. Each pair must be members of the same, or an associated, firm, but any number of pairs may enter from one firm. Last year, for example, one firm was represented by six pairs and another by three, and this year we should like to see some of the larger concerns sending in a dozen or even twenty double entry forms.

The actual arrangements for playing the rounds are extremely simple. As soon as the draw and date for the first round are announced in THE CHEMICAL AGE, the opposing pairs will decide between themselves when and where the round is to be played. Immediately after the contest, all four players will sign the result, which must be forwarded to the Editor of THE CHEMICAL AGE so as to reach him not later than first post on the day following the final date for playing off the round. The results and second round draw and date will then be announced, and the same procedure will be followed until the final, when special arrangements, which will be announced later, will be made for playing the final on a hard court in or near London.

Although last year was the first time in the history of THE CHEMICAL AGE that such a tournament has been arranged, and only short notice was given before the closing date had to be announced, a gratifying number of entries was received, and the tournament was followed with the keenest interest throughout by many firms in the chemical industry.

Rules

1. Every competitor must be a member of the chemical industry, either as a principal or a member of a staff. There is no entrance fee of any kind.

2. Each pair must be members of the same, or an associated, firm.

3. The Challenge Cup shall be competed for annually on courts of any surface in accordance with the Rules of Lawn Tennis and the Regulations of the Lawn Tennis Association. The winners of the Cup shall make arrangements for its safe custody and insurance.

4. The competition shall be conducted on the knock-out principle, and the best of three advantage sets shall be played in all matches.

5. Entries shall be made not later than May 2, 1932, and addressed:

"Lawn Tennis Tournament,"
"The Chemical Age,"
Bouverie House,
Fleet Street, London, E.C.4.

6. The draw shall be made on the first convenient day following the close of entries. The dates on or within which the several rounds must be played will be published in THE CHEMICAL AGE.

7. The Editor of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations governing this competition.

8. Except in the case of the special period set apart for the final stages of the competition, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement, the first name drawn shall have the right to choose the ground.

9. In the general interests of competitors throughout the country it has been decided to divide into areas as far as possible all matches up to, and including, the Semi-Finals, the rule as stated under Clause 8, however, still standing.

10. The result of each match must be sent by the winners to the Editor of THE CHEMICAL AGE, signed by all four players (winners and losers) immediately after the match, and must reach the office of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round.

11. If any player be not present at the agreed place or time of the match, opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the others' appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which both sides agree, within the stipulated period.

12. Any dispute arising between players, or otherwise, shall be referred to the arbitration of the Editor of THE CHEMICAL AGE, whose decision shall be final.

13. While competitors will make their own arrangements as to hard or grass courts for the preliminary rounds, it must be understood that the Finals will be played on hard courts.

[The Latest Date for Receiving Entries is May 2, 1932].

Cut along this line and post as directed.

Entry Form

We have read the Rules of THE CHEMICAL AGE Lawn Tennis Tournament, and agree to abide by them.

Name of Competitor .....

Name of Firm .....

Firm's Address .....

.....

Telephone No. .....

Name of Competitor .....

Name of Firm .....

Firm's Address .....

.....

Telephone No. .....

The Chemical Industries of Lancashire

How the County is Upholding its National Reputation

THE name of Lancashire has been so frequently identified with cotton that many may be pardoned for thinking its activities are almost limited to the textile industry. It is true that Lancashire possesses more than half the cotton spinning spindles of Europe and more than a third of the world's total spindles, but Lancashire not only clothes the millions; it might well be described as the home of the British heavy chemical industry. The County Palatine has an Industrial Development Council, of which Lord Derby is president, and this body, which comprises representatives of thirteen chambers of commerce, six local development organisations, railway companies, banks, electricity and gas undertakings, the coal industry, the Mersey Docks and Harbour Board, the Manchester Ship Canal Company and the Trades Union Congress General Council, is dealing with many inquiries relating to new industries.

The Development Council has lately issued an illustrated brochure entitled "Lancashire: An introduction to the commercial and industrial resources of the world's greatest manufacturing area, with some account of its past history and present activities," as part of its effort to spread a real knowledge of Lancashire throughout the world at a time when it is hoped to attract more manufacturing enterprise to the county. The brochure states that the latest official analysis of the occupations followed in Lancashire and those neighbouring districts which make with it one industrial whole are contained in the 1921 census. There have been changes since then; but none which alters the truth of the general picture presented, though a correction in detail will be made here and there when the new figures are published. The district described is "Lancashire and parts of Derbyshire and Cheshire"—a district responsible for an amazing percentage of all the work done in England and Wales. Here are some of the details:—

Industry.	Lancashire district's percentage of total workers in England and Wales.
Glass manufacture (other than bottles)	42
Manufacture of alkalies and heavy acids	37
Manufacture of soap, candles, glycerine	57
Textile bleaching, printing, dyeing, finishing	55
Tanning, currying and leather dressing	21
Manufacture of felt hats	80
Paper and board making	24
Manufacture of tyres and other rubber goods	33
Manufacture of lino, leather cloth, oil cloth	64

Some Typical Products

The infinite diversity of trade and industry that has found Lancashire convenient and profitable up to the present day is no bad guarantee that satisfaction will reward the enterprise of the future. Apart from the great industries of cotton and coal, many industries have found in Lancashire the qualities necessary to nurture their youth into the full strength and status of prosperous maturity. The great engineering industries found here all the circumstances that conduce to rapid advancement. The chemical works of Widnes, St. Helens and Liverpool; the making of things so diverse as rubber and locomotives; the healthiness of the paper-making trade in the ring of towns round Bury; the flourishing hat trade of Denton, the slipper trade in North Rossendale, the glass-making at St. Helens—all these are eloquent witness to the healthiness of Lancashire air in expanding the lungs of industry.

Sulphuric acid is produced in large quantities in the Mersey and Irwell region from Liverpool to the east of Manchester, and the Mersey area is the greatest centre in the world for the manufacture of the alkalies. Coal tar distillation and the production of the more important chemicals and coal tar colours is largely centred in the county. Lancashire soap and allied products are exported to the remotest corners of the world, while Britain's greatest glass making region may be regarded as part of the famous chemical region north of the Mersey. Lancashire, too, is famed for its paper manufacture. The paper industry has grown up side by side with the cotton industry because cotton waste and cotton rags formed one of its chief raw materials. Bury is the centre of the paper machinery industry, and is itself a great home of paper manufacture. Lancashire leather is renowned not only for footwear but for driving machinery and plant in every industry, and one of the largest rubber works in Britain is situated at Leyland, while Liverpool also has a big share in the rubber industry.

Choice of Sites

The industrialist to-day has a wider choice of sites in Lancashire than can be found in any comparable area throughout the world. The making of the Manchester Ship Canal, for one thing, has had a profound effect on the site question. Here is a waterway leading from the great port of Liverpool to the hardly less great port of Manchester. It is thirty-five miles long; that is to say, it has a water frontage of seventy miles. Almost the whole of that seventy miles is land of high site value, for to have one's factory or warehouse on the canal amounts almost to having it on a dockside. There are, indeed, docks here and there along the canal, apart altogether from the two famous series of docks in which it begins and ends.

The towns and cities of Lancashire are thoughtful for the minds as well as the bodies of their citizens. It was in these parts that those institutions began which were called Mechanics' Institutes; and out of the Mechanics' Institutes has evolved the vast system of technical education which has spread from one end of the country to the other. Before the coming of specialisation there were schools in many parts of Lancashire whose history goes back through the centuries. It was in Lancashire that the first of the new universities came into being; and now Manchester and Liverpool has each a university of its own. It is worthy of note that the municipal authorities, not only of the towns in which the universities are sited but also of the towns that send students to the universities, are actively interested in their well-being.

Lancashire Industrial Development Council

One of the first tasks of the recently formed Lancashire Industrial Development Council was to bring Lancashire to a realisation that she is not only the greatest industrial area in the world but is also the cradle of another industrial revolution. The Council's brochure has met with the warmest appreciation not only from those interested in the industrial development of the north-west but from unexpected quarters both in this country and overseas. The book sets forth in a convincing manner the undoubted advantages which Lancashire has to offer not only for the British industrialist who is seeking a location for the extension of an existing enterprise but also for the establishment of entirely new industries. It also makes a strong appeal to the foreign industrialist who has hitherto enjoyed the advantages of the British market for his output and who by reason of the change in currency policy and the introduction of import tariffs is seeking to transfer his manufacturing plant into Great Britain.

It may well be pointed out that Lancashire is practically the only area in the kingdom with a deep water frontage, extending for many miles in the heart of an industrial area. Within 80 miles of Manchester there is a population equal to the combined population of Canada and South Africa—a population which exceeds in number the population to be found within a radius of 80 miles of London and thus presents an immediate large consuming market for the industrialist. The excellent network of railways in Lancashire, its efficient road and canal transport, its reserve of trained labour, its numerous industrial activities outside the staple industries of coal, cotton and engineering, are all factors which cannot fail to bring the foreign industrialists to regard the area as the most attractive field that Great Britain has to offer as a seat for industrial enterprise.

A number of foreign industrialists have already realised this and the Lancashire textile industry, diversfied as its productions are, has been supplemented by the influx of Continental textile manufacturers who, for some years have

turned their attention to textile specialities which Lancashire in her pre-occupation with the production of numerous types of textile goods on an enormous scale had left to the Continental producer.

British firms from other parts of England in such diverse industries as boots and shoes, jams and preserves, margarine, cattle foods, etc., have all decided to extend their manufacturing plant to Lancashire. Numerous inquiries have been received from abroad for works for many new industries and the unparalleled advantages which Lancashire has to offer to the foreign industrialist is beginning to be realised in such a way that the Lancashire Industrial Development Council is convinced that its efforts to establish the undoubted claims of Lancashre as a field for industrial enterprise will bring solid advantages not only to the county but to those who take advantage of the opportunities the area can offer.

Recent Developments in Important Industries

A New Industrial Gas Advisory Station

Over 3,000 trades in Great Britain use gas for an average of seven processes in each trade, and most of these industries are represented in Lancashire, from textiles and heavy engineering to biscuit-making and laundering, with processes ranging from riveting and annealing to stentering and calendering. To-day a heavy and increasing percentage of the gas output in Lancashire is sold to industrial users. In a compact industrial area like Lancashire, with immense supplies of cheap coal at hand, it is not surprising that the gas undertakings should be able to sell gas for industrial purposes at extremely low rates. In addition to supplying cheap gas, the Lancashire undertakings have set themselves to make a special study of the fuel problems of each individual trade. Arrangements are being made, under the auspices of the National Gas Council, for expert advice and assistance to be given to manufacturers as to the best application of gas for industrial purposes. An industrial gas advisory station, with the necessary laboratory accommodation for the investigation of the particular needs of manufacturers, is being set up to provide for and serve the industrial needs of the Lancashire area. The manufacturer will be encouraged to bring all his industrial heating problems to the experts of the advisory station, and to bring them, if possible, before his plans are completed, so that it will be possible to prepare for the most economical application of gas to his particular needs.

For several years the textile trades centred in Lancashire have been among the biggest customers of the gas undertakings, but it is in other industries that the use of gas is growing most rapidly. A few instances are those of food preserving and canning, where gas can be used for steam raising, soldering, and other operations; the manufacture of leather goods, where gas is used for heating, power, drying, melting, softening; sealing and other processes; paint and varnish manufacture, where gum-running, oil boiling and lacquer and enamel drying require gaseous heat; and furniture manufacture, where steam is required for bending purposes, and heat for glue-pots, cawl-plates and the like. Dr. C. M. Walter, in a recent speech at Manchester pointed out that the true cost of fuel application involves not only the cost of the fuel itself, but also the cost of all material damaged or scrapped as a consequence of imperfect heat treatment. From a survey of typical examples of production work, in which the ratio of the fuel cost to the cost of raw material was found to be comparatively small, Dr. Walter pointed out that total production costs may be considerably cut by the elimination or reduction of wastage of material—a reduction made possible by the application of town's gas.

Electrical Development

Everyone to-day has direct evidence of the electrical developments which are taking place, as evidenced by the vast network of the "grid" transmission lines which have been and are being erected all over the country. In Lancashire, at present, the work of the "grid" is progressing visibly in all directions and the whole of the 570 route-miles in the North-West England and North Wales area will shortly be in commission. Industrial Lancashire, however, has not had to wait for the "grid" to give it both cheap and abundant electricity. By the enterprise of some of the large municipal and company undertakings interlinking of generating stations has been in operation in Lancashire for many years and the possibility of interlinking on a national scale has been demonstrated by the success of the interlinking in Lancashire on a comparatively small scale.

The use of electricity in Lancashire to-day is represented by impressive figures and many of the largest industries depend solely on it; and some, such as the electro-chemical works of which there are several instances in Lancashire, the large electric accumulator works and the various artificial silk concerns working, as they do, 24 hours per day, are possible only because of cheap electricity. It is not only in the application of electricity for driving machinery that developments have taken place but, in many other directions, new uses have been found for electric power. Electric-welding, for instance, is fast superseding riveting and, in the manufacture of electrical plant, fabricated machines, with their parts welded together, are rapidly taking the place of machines with heavy cast-steel bodies. Again, steel furnaces produce steels of a quality practically unobtainable by any other method, and heat-treatment of other metals in the electric furnace, with complete automatic control, is being widely used. Enamelling and stoving in a dust-free, inert or special atmosphere is another development. The growth in the use of electricity for heat in industry is opening up large new fields both for process-work and new methods of manufacture and, as a result, the necessity for technical advice and facilities for experimental work has become increasingly evident. Large scale demonstrations of the various channels in which electricity is steadily supplanting other and older forms of heat have been regularly given for several months past in Manchester at the instance of the Manchester Corporation and all the largest supply authorities are studying these new developments and have staffs for the express purpose of giving technical advice and assistance to industrial undertakings wishing to adopt any of the new systems.

Iron Carboy Hampers

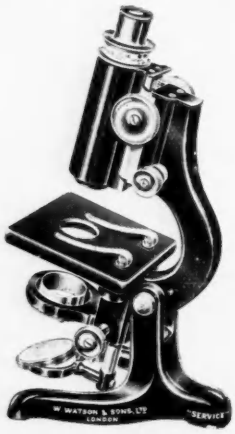
The "Vulcan" iron carboy hamper, the type which has been used by the chief chemical manufacturers for the past half-century, is manufactured by P. L. and G. S. Harris, Ltd., at Lostock Gralam, Northwich. They also make safety crates and hoods to comply with the Railway Clearing House regulations governing small loads of carboys on rail. Large stocks of glass carboys, packed ready for use in "Vulcan" hampers, are maintained, and the company's well-placed railway siding enables prompt delivery to be made.

Mastic Asphalte

Considering the fact that mastic asphalte in one form or another forms a potential money saving factor in practically every branch of industry, it is rather surprising that this valuable and versatile material is not utilised far more widely than is actually the case. John Dickinson and Co. (Bolton), Ltd., realising the obvious advantage of a specialised study of mastic asphalte are now, as a result of the collaboration of scientific principles and practical experience, able to offer a comprehensive and efficient range of mastics to suit all appropriate industrial purposes. Among these specifications may be mentioned "Aciteneo" acid resisting asphalte, for floor surfacing and tank lining, the efficiency of which will be testified to by the many firms whose acid loss and corrosion problems have been overcome by this medium. "Tropicas" hard flooring asphalte is without a rival as a floor surfacing where heavy trucking, standing weights and high temperatures are to be encountered. Both the raw materials and finished products are subject to the closest analytical supervision by the firm's well equipped laboratory, ensuring the complete standardisation of the asphaltes made. This enables the company to undertake work with the fullest confidence in being able to complete a thoroughly satisfactory and durable job backed, if required, by a substantial guarantee.

Laboratory Apparatus

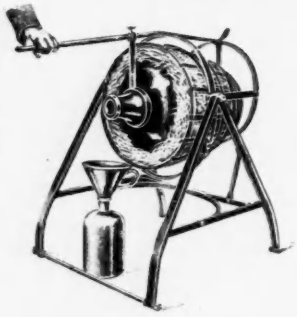
The manufacturing operations of James Woolley, Sons and Co., Ltd., of Manchester, are upon a scale commensurate with their widespread mercantile transactions, and are conducted with every regard for efficiency and the ensuring of the highest technical results, the staff including a notable proportion of qualified chemists capable of dealing competently with important and responsible work. They are also well-known makers of pure chemical reagents for laboratory work, standard volumetric solutions, bacteriological preparations, micro stains and other solutions. The laboratory furnishing department is at 76 Deansgate, and here glassware and laboratory equipment of every description is stocked. The company has been successful in providing for the present day requirements of microscopes, microscopical accessories and biological instruments. We give an illustration of the latest pattern "Service" microscope made by Watsons of London, for whom they are agents. Artificial sunlight, both as regards its application to medical treatment and its uses in the chemical laboratory receive close attention, and lamps suitable for both purposes are available.



Another speciality is found in first-aid outfits to meet Home Office requirements, which now extend to almost all mills and factories throughout the country. The company has originated a complete series of cabinets covering the various industries to which the Home Office Orders apply. It also supplies boxes, cupboards, cabinets, etc., for institutions, collieries, railways, offices, schools, motors, and the home. The furnishing of first aid units and rest rooms is also undertaken. This firm, by the way, publishes a concise and useful pocket laboratory companion under the name of the "Scientists' Reference Book." It was first issued more than twenty years ago, and has now a circulation in all English speaking countries. The price of the book is 2s., or combined each year with a diary at 3s. 6d. It should be in the hands of every practical chemist.

A New Carboy Barrow

R. and H. Leigh and Sons, Ltd., of Orlando Ironworks, Bolton, are the original inventors of "Zulo" iron hampers for carboys, and for 55 years they have been the leading makers. The old-fashioned practice of employing wicker baskets died slowly in many places, but it is now almost obsolete for carboys of British manufacture. In constructing "Zulo" carboy hampers, the steel hoops are deeply grooved, obtaining great strength. One of the hampers when inverted will support a hundred times its own weight without crushing. This may be demonstrated by inverting the hamper, weighing about 9 lb., and gently lowering a weighted cask of about 8 cwt., steadying it upon the hamper; under these conditions the hamper will sustain the weight without weakening. This firm also supplies glass carboys, either packed in hampers or without hampers; safety crates for rail traffic, single carboys and small lots; carboy stoppers, fasteners and rubber caps. Various designs in emptiers are also available, as well as carboy barrows and trucks. Its latest carboy barrow is an improved design to assist the maintenance of balance in wheeling. This barrow can be fitted, if desired, with Dunlop wheel and pneumatic tyre, the tyre being inflated with a cycle pump.



The Linfield Heater Circulator

Central heating by the injection of live steam into a low-pressure hot water circuit has not received much attention of late years, but in certain directions it offers advantages not easily secured by other methods. In large institutions having scattered blocks of buildings where a central steam boiler-house is a necessity for heating processes, it is easier to carry a well-lagged steampipe to the various blocks, and a small return pipe for condense, than to lay down flow and return mains of comparatively large diameter for circulating hot water. A further advantage is that the heating of each block is directly under control in the building which is being heated. In large industrial establishments, too, where a central heating system is installed for dealing with the main departments, there are often detached buildings, such as stores, temporary offices, workshops, etc., which are not in constant use and are awkward to connect to the central system, and especially difficult to arrange for occasional heating. A small supply of steam from the main boiler and a self-contained means of distributing the heat would solve many such problems.

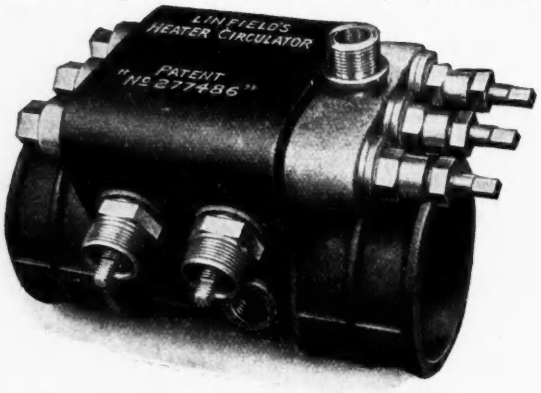


FIG. 1. MODEL WITH SOCKETED ENDS FOR GLASSHOUSE AND SIMILAR CIRCUITS.

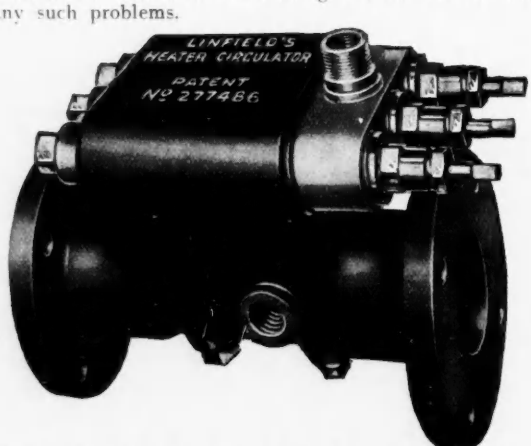


FIG. 2. MODEL WITH FLANGED ENDS FOR HEATING CIRCUITS IN WORKS AND TALL BUILDINGS.

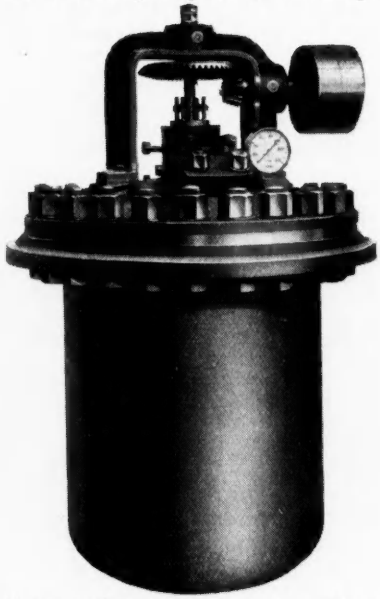
An appliance for injecting steam to water, which may also be made to give forced circulation of the water, can be less bulky and cheaper than a surface heater or calorifier, and also saves the first cost and running expense of a power-driven accelerator for the hot water.

These considerations lend interest to an instrument known as the Linfield Patent Heater-circulator, designed to effect central heating by the direct admission of steam to low-pressure hot-water circuits, giving what has been called "steam-controlled water."

A descriptive circular can be obtained from the manufacturers, the Sihi Self-Priming Pump Co., Standish Road, Fallowfield, Manchester.

Meldrum Metal

The suitability of Meldrum metal for severe conditions is well evidenced in its application as a lining for tanks. Its extreme hardness renders it especially suitable for any vessels where rough or gritty materials have to be mixed with acids. The fact that it is completely resistant to sulphuric, nitric



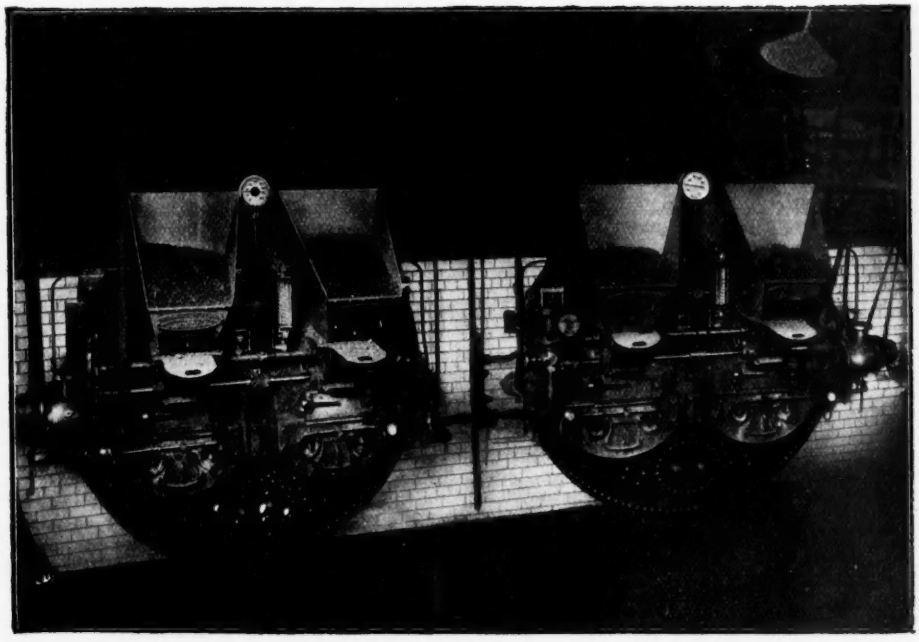
MELDRUMS' AUTOCLAVE IN CAST STEEL.

or acetic acids of any strength or temperature and is absolutely resistant to abrasion renders it the most satisfactory material available for this purpose. In lining tanks the bottom plates are composed of sectors fitting round one central disc and for large tanks there are, of course, more than one row of sectors. The side plates are arranged with a tongue on one side and a groove on the other so that they are interlocking. When these are fixed in position with acid resisting cement an extremely sound tank is made capable of resisting acids hot or cold and heavy abrasion. An agitator for these materials can also be made of Meldrum metal and in this case also it resists perfectly the acids and also the abrasion.

A further example of the work Meldrums, Ltd., is the autoclave here illustrated. This vessel is of cast steel and is arranged for a working pressure of 70 lb. per sq. in. and a test pressure of 1,500 lb. The vessel is equipped with agitator gear, themometer, pressure gauge, and the usual inlet and outlet pipes, filling holes, etc., also a blow-off pipe to discharge the contents. The vessels is surrounded with a steel jacket and heated by a gas fire. The extreme accuracy required in these high pressure vessels is a feature of the work. A recent installation of Meldrums' mechanical stokers has shown extremely efficient results. This installation is at Kaye and Stewart's woollen mill, Huddersfield. When using fuel of 14,000 B.Th.U. the evaporation of water per lb. of fuel is 9.8 lb. actual and the efficiency 78 per cent. The installation consists of four Lancashire boilers equipped with Meldrums' sprinkler stokers with forced draught. A feature of this stoker is the hollow fronts through which the secondary air for combustion is passed. A further feature is the extraordinarily low cost of upkeep. A machine fixed at a mill in Morley four years ago has only cost 4s. 6d. in repairs to the present day. This refers to the grates as well as the firing mechanism. A typical illustration of these stokers which are giving such high efficiency and low upkeep costs is shown in the accompanying picture.

Artesian Well Boring

The firm of John Thom, Canal Works, Patricroft, Manchester, is one of the largest artesian well boring concerns in the country, and has carried out many extensive schemes in connection with all kinds of industries and for various municipalities. In the manufacture of silk, artificial silk, woollen and cotton goods, water in large quantities is used by industrial plants, and in many towns, where water is expensive and ranges from 7d. to as much as 2s. per 1,000 gallons it has become imperative in face of present day competition, to look for new sources of water supply. This is particularly so in the case of industrial areas where there are no rivers or other surface supplies. The firm of John Thom has many notable well boring achievements to its credit, and is at present engaged in a number of schemes in preparation for the revival of industry which is already showing signs of development in Lancashire.

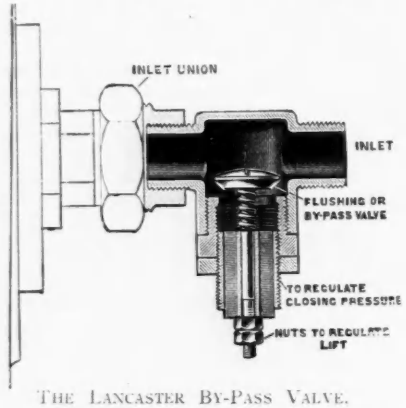


MELDRUM SPRINKLER STOKERS WITH FIXED GRATES AND FORCED DRAUGHT, FITTED TO TWO 7 FT. 6 IN. LANCASHIRE BOILERS, FOR A LANCASHIRE FIRM OF LARD REFINERS.

Lancaster Steam Traps

A steam trap may be simply defined as a machine for draining condensed water away from a vessel containing steam, without allowing the latter to escape. This function is, however, complicated by so many conditions that there is a large field for investigation open to anyone who wishes to do the work economically, *i.e.*, to remove the water with the minimum loss of heat, and in the shortest time. Traps may be divided into two classes, those having the valve at the inlet to the trap, and those having it at the oulet. In the first case, the valve has to be held to its seat against the steam pressure until water is to be drained away, and in the second case, the valve has to be pulled off its seat against the pressure when water has to be drained.

The first type can be set to drain water away at 212° F. from any pressure of steam and thus conserve heat units



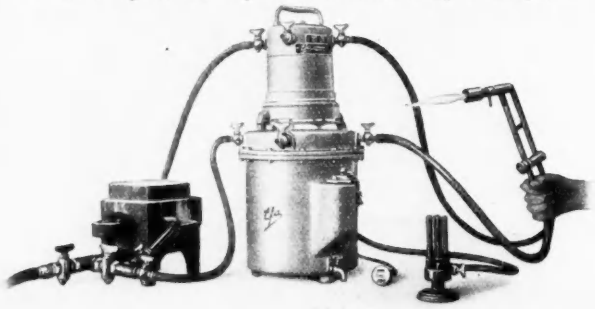
The Lancaster By-Pass Valve.

where a high temperature is not required. The second type has the full pressure inside and will only drain the water away at the saturation temperature of steam, which, even at 60 lb. pressure is over 300° F., but in this type, all the water must be drained away and steam enter the trap before the valve closes. In either type the size of the hole closed by the valve is limited by the steam pressure, so that if the trap has to work at varying pressure, the discharge will be less at the lower pressures. In most cases where a machine or vessel has to be heated, some time elapses before the steam pressure is able to rise to anything like the working pressure owing to rapid condensation.

Lancaster and Tonge, Ltd., engineers, of Pendleton, Manchester, have taken advantage of this fact to design an automatic valve, to fit to the outlet of the trap. This will remain full open until the pressure in the machine or vessel rises to within a few pounds of the working pressure, when it will close automatically and leave the trap to deal with the remainder of the condensation, which is often less than one-tenth of that at the start. Thus, the time of heating up is reduced and a smaller trap may be used. The illustration shows the by-pass valve open and it can be regulated to close at any required pressure, as shown.

Scientific Glass Blowing

The advance in industry and the changes in method and manipulation is very marked in most works. In a modern glass house the machine made bottle and beaker often oust the older individually made article. This, however, only feeds the scientist, be he on routine work, or research, up to a point. Whilst his resources are enlarged, so are the calls on specialised skill. Certain bedrock necessities there are: really well ground taps, tubing which can be relied on to stand up to the requirements of the experiment, bulbs and



flasks attached to graduated vessels, all of which can be explicitly relied on. Whilst it is necessary to entrust this to men of experience and in close touch with the use to which things are to be put, every laboratory must be equipped to do its part. A good steady stream of air for the blowpipe, for drying vessels, for use in all sorts of chemical operations, has become a necessity. A portable blower, as illustrated, which can be used wherever required, to which half a dozen blowpipes can be attached simultaneously without alteration of pressure, is a great boon. This is best obtained by the use of the Ako electric blower. It can be connected to any plug or lampholder, is almost noiseless in action, of robust build, yet of small size and small initial cost, as well as being low in current consumption. Where no gas is available there is a form which can be utilised with petrol gas. The Scientific Glass Blowing Co., Manchester, are the sole agents and can thus help to equip the laboratory as well as make anything requiring special skill and experience.

Cancer-Producing Properties of Mineral Oils

Researches at Manchester

A scientific report on the study of the cancer-producing properties of mineral oils, such as are used in the lubrication of cotton spinning machinery, has been issued by the Manchester Committee on Cancer. The research work is carried out by a joint committee of representatives of the Manchester Committee on Cancer and the University of Manchester. The Anglo-Persian, the Anglo-American, and the Shell-Mex Oil Companies are jointly contributing £1,000 for two years towards the cost of research work. The report shows that the synthesising of a cancer-producing substance from inert organic material has yielded a synthetic tar of such high concentration that a dilution of one part in a thousand of this substance yields tumours in the animals subjected to experiment as numerous as those obtained with shale lubricating oils. Only one definitely active pure compound has yet been isolated from this tar, of comparatively small power to produce tumours, but it is found that the cancer-producing ability of this compound is markedly increased by the addition of oleic acid, which accordingly is now regarded with some suspicion as a counter-promoting agent. Attempts are being made to treat mineral oils with sulphuric acid in such a way as to render the oils innocuous, but it is not yet clear that the full benefit of such treatment as demonstrated in laboratory conditions can be derived from the ordinary commercial use of acid. It has been found that a special clay, when used for the purification of marketed shale oil, reduces the potency of the oil as a cancer-producer by 75 per cent. Similarly, the addition of 5 to 10 per cent. of sperm oil to the shale oil reduces its toxic potency by 66 and 75 per cent., and anhydrous lanolin reduces the potency by 90 per cent.

Experiments with blends of other mineral lubricating oils and sperm oil are in progress, and the indications available are that the sperm oil blend is substantially less toxically active than the control pure mineral oils. The committee accordingly recommend that the owners of spinning mills should mix into their lubricating oil the necessary quantity of sperm oil or lanolin, and preferably should use mineral oil. The most potent cancer-producing oil yet tested is unfinished shale oil, untreated by sulphuric acid. Mineral oils obtained from petroleum wells vary considerably in their toxic activity.

News from the Allied Industries

Sugar Industry

THE FIRST LARGE FACTORY PLANT for the extraction of sugar as well as alcohol from wood has been erected by Dr. Schaal, near Uetersen, Germany. It is hoped that this plant will form the basis for a new national industry for Germany.

Iron and Steel

A BITTER PROTEST AT THE TARIFF WALLS which various countries, particularly Great Britain, had put up against German exports was made by Herr Voegler, chairman of the German Steel Trust, at the general meeting at Dusseldorf, on Friday, March 18. Germany, he said, would have to counter these tariffs by imposing similar tariffs on imports. He intimated that a proposal to this effect was to be submitted to the Government. Germany's steel exports last year were 25 per cent. less than in 1930. The Trust ended its business year 1930-31 with a loss of £945,500.

Tanning and Leather Trades

THE FEDERATION OF CURRIERS, Light Leather Tanners and Dressers recently held its annual general meeting at Leathersellers' Hall, when the following officers were elected:—President, Mr. Chas. A. Pearce (W. Pearce and Co., Northampton, Ltd.); deputy president, Mr. A. D. Ormerod (John Ormerod and Sons, Ltd.); chairman (Light Leather Tanners' and Finishers' Section), Mr. John Bates (Charles F. Stead and Co., Ltd.); chairman (Upper Leather Curriers' and Dressers' Section), Mr. Fred Corby (Fred Corby, Ltd.); chairman (Case, Harness and Upholstery Curriers' Section), Mr. Leslie Turner (W. and A. J. Turner, Ltd.); chairman (Chrome Leather Manufacturers' Section), Mr. Harry Holder (John S. Deed and Sons, Ltd.).

THERE HAS BEEN A PRE-HOLIDAY TONE about the leather trade for a week past, and business is generally very quiet. Judging by the sales effected during the past two or three months it is evident that the purchases made before the end of 1931 in anticipation of increased prices were considerable, for the consumption demand in the interval has been on a very low level. For the time being, therefore, there is keen competition for the stock required, and it is asserted that sole tanners are getting something below cost for their goods. Market hides are cheap, and those going through the yards should be profitable leather if business improves as it gives promise of doing.

China Clay

DETAILS OF RESEARCH WORK for the eradication of silicosis in the pottery industry were given to members of the Ceramic Society at their meeting at Stoke-on-Trent last week. Mr. Bernard Moore said his discovery was a sequel to experiments he made 25 years ago. He then found that flint mixed under favourable conditions with the bone-ash—which constituted about 50 per cent. of the English china body—caused some of the latter to decompose. This fact prompted him to search for a material which did not decompose, with the result that he found that promising results were obtained by the substitution of 75 per cent. of calcined bone and 25 per cent. calcined alumina for flint. His experiments proved that bone china placed in this material withstood extra firing without decomposing, and in addition, that there was a marked improvement in the colour of the china.

REPRESENTATIVES OF THE CHINA CLAY producing companies met at St. Austell, Cornwall, last week, when it was decided immediately to form an association representative of the British china clay producers. This meeting was convened by the Federation of British Industries at the request of the trades concerned, owing to the fact that there was no organisation in existence which would enable the china clay industry to talk with a single voice. It was not suggested that the proposed association should deal with such questions as general price control, or matters affecting the domestic policy of any of its associated concerns. The primary object of the association will be to enter into negotiations with the French National Association of China Clay Producers in order to consider possible means of obviating the fixing of a quota by the French Government on the imports of china clay, which, it is understood, the French Government is contemplating doing.

Wrapping Materials

A NEW WRAPPING MATERIAL known as Kodapak, manufactured from cellulose acetate, is being produced in the United States by the Eastman Kodak Co. Kodapak differs from most transparent wrapping materials in that, instead of being derived from wood fibre, it is a cotton product made by the transformation of original cotton into cellulose acetate and finally into transparent, pliable sheeting. It has a brilliant glass-like clarity and a silvery appearance when crumpled. Its limpness permits folding easily and neatly around corners of packages; it can also be readily cemented. Kodapak is also claimed to successfully withstand the action of liquid without softening or distortion of shape, is highly transparent and colourless, has no tendency to become brittle in extreme cold, and will withstand high temperatures without colouring.

Paint and Varnish

TO JUDGE FROM SIR GEORGE MACDONOGH'S remarks at the meeting of the International Paint and Compositions Co., Ltd., held in London on March 18, the difficulties of the past year may well prove to have strengthened, rather than weakened, the company's business, for they have demonstrated the value of a broader basis of trade. Recent efforts to extend its activities have apparently been fruitful, for the inland trade has expanded satisfactorily, and the company now claims to be able to supply coatings for "every conceivable purpose." The company proposes to pay 3 per cent. on the preference shares, making the full 6 per cent. for the year, and a final dividend of 6 per cent., as against 9 per cent., on the ordinary shares, making, with the interim dividend, 9 per cent. for the year, as against 12 per cent. The total amount of the final dividends will consequently be £38,070, making a grand total of £60,105 distributed among the shareholders in respect of 1931.

Rubber

ABOUT FIVE HUNDRED WORKERS in the golf ball, coats, and clothing departments of the North British Rubber Works, Edinburgh, who were suspended from work last week will now resume work on the basis of three days on and three days off. With the closing down of the Castle Mills on Wednesday, March 16, practically 3,000 employees were thrown out of work.

THE NEGOTIATIONS WHICH HAVE BEEN PROCEEDING between the British and Dutch Governments, in association with rubber growers, for a curtailment of the rubber output, have ended in failure. According to the official announcement issued by the Colonial Office on Saturday, March 19, the two Governments were forced to the conclusion that in present conditions it was impossible to frame and operate an international scheme which would guarantee the effective regulation of the production or export of the commodity. It is understood the chief obstacle to the framing of a scheme was the native production in the Dutch East Indies. This is so haphazard as to be incalculable, and impossible to bring within a quota scheme. World stocks of rubber are estimated at upwards of 700,000 tons, or enough to meet the whole demand for a year. From 4s. 8d. per lb. in the early post-war years, the price of the commodity has sunk to about 2½d. or 3d. per lb. In its effort to find a way out of the calamitous position of the rubber industry, the Conference is stated to have considered over forty different schemes. For some time it appeared there might be some hope of combining a quota upon the plantations with an export duty upon native rubber. This idea failed, however, in view of the difficulty of coast-line control. Some of the meetings have been in Great Britain, some at The Hague, and some have been on the scenes of the greatest rubber-growing activities in British Malaya, Ceylon and the Dutch East Indies. The final series of conferences began about three months ago. Sir Philip Cunliffe-Lister, the Colonial Secretary, energetically tried to reach finality. The British Government's representatives had the advice of, among others, Mr. J. G. Hay, of Guthrie and Co., Mr. H. E. Miller, of Harrison and Crosfield, Ltd., and Mr. F. D. Ascoli, managing director of Dunlop Plantations, Ltd.

Letters to the Editor

Corrosion-Resisting Materials

To the Editor of THE CHEMICAL AGE.

SIR,—We were very interested in "Chemical Manufacturer's" letter in your issue of March 12, under the heading of "Corrosion-Resisting Materials" and should like an opportunty of being placed in direct communication with him, as we are confident that we could solve his difficulties in regard to properly homogeneously lead-lined vessels.

As possibly you are aware we have now been supplying homogeneously lead-lined tanks, pressure vessels, vacuum vessels, jacketed pans, coils, etc., to the chemical manufacturers in this country for some time past and claim that we can offer an article in every respect as good as, if not better, than any made on the Continent, whilst our prices, apart from any tariff, compare very favourably. In many instances we have secured work in the face of foreign competition.

Until comparatively recent years, the business of homogeneous lining was almost entirely in the hands of Germany, and firms in this country who were carrying out such work were doing so under licence from the German firms. We, however, perfected a system of our own for the homogeneous covering of vessels, and are in no way subservient to any German or other foreign concern. Our linings are applied in such a manner that both metals are knit together and really become one, and it is impossible to separate the two component parts even under the most trying working conditions. In addition, the nature of the lead is not affected in any way by the process employed and still remains malleable and ductile. Sagging, blistering and creeping are entirely avoided whether the plant be working under pressure or vacuum, and whilst maintenance and repairs are reduced to an absolute minimum, any repairs which are due to local unforeseen corrosion or accidental damage can be easily effected without stripping the lead from the remainder of the vessel. Our homogeneous linings will also withstand vibration, which is often met with in vessels provided with agitating gear.

If "Chemical Manufacturer" cares to communicate with us we shall be delighted to meet him and will willingly show him our works and some of the plant that we are now building and at the same time will furnish him with the names of some of our more prominent clients, who will, we believe, be prepared to state that our work satisfactorily fulfils every claim that we make for it.—Yours faithfully,

R. MARSH AND CO.,
R. MARSH,
General Manager.

Riverbank Works, Sugar House Lane,
Stratford, London, E.15.

To the Editor of THE CHEMICAL AGE.

SIR,—Our attention has been drawn to the letter of "Chemical Manufacturer" in THE CHEMICAL AGE, March 12, and we quite appreciate his desire to be assured of the quality of plant obtainable in this country, despite, possibly, unfortunate experiences in the past. Comparison should, of course, only be made between the *best* materials obtainable in this country and "on the Continent."

With regard to homogeneous lead lining we agree that there may be manufacturers in this country who sell lead-lined plant, so-called "homogeneous," but which will not stand up to vacuum conditions. Chemical manufacturers can avoid purchasing such plant by dealing only with firms who have made a special study of this important industry, who have the very necessary length of experience, who habitually test their work under both steam and vacuum conditions, and *welcome* inspection by customers' engineers. Only by exercising all the above precautions (amongst others) can really successful lead-lined plant be obtained.

It is 15 years since we commenced our experiments on and manufacture of vessels with linings superior to the old loose-lined type. During this period we have developed *our own process* at our works, and in the development have discarded many of the methods now being practiced, by some of our competitors. For many years we have now supplied the leading chemical manufacturers of this country with homogeneously lead-lined plant for their most exacting duties, and the fact that they come to us repeatedly with their problems, new and old, is sufficient warranty of our claims. Our plants have been in use for years, not only on road and rail transport, but under conditions of erosion, as in mixers, under steam pressure, continuous and intermittent vacuum, and latterly at temperatures of well over 200° C.

Another important point on homogeneous lead work is that some fabricators use fluxes which affect the purity of the lead coating somewhat and this sometimes leads to contaminations of product, or the lead is attacked by the acid as you are evidently aware. All our lead is specialy refined for us, submitted to our own tests both before and after application to the vessels, and is guaranteed to be at least equal to B.S.S. No. 334, for flash point, even after application to the vessels. When chemical manufacturers are satisfied that chemically pure lead to the above specification is suitable for their process they need have no fear as to the suitability of *our* homogeneous lead-lining.

We therefore contend that there is no need for chemical manufacturers to go to the Continent for homogeneous lead-linings on the ground of quality or reliability, and we are prepared to meet a fair competition on a basis of quality and service. With regard to stoneware, we do not manufacture this ourselves, but we have supplied and erected acid towers and acid resisting tile-lined vessels as part of complete installations for the largest chemical combine in this country, and these are giving satisfaction.—Yours faithfully,

JOHN THOMPSON (DUDLEY), LTD.,
W. THOMPSON, M.I.Chem.E.

Windmill Engineering Works,
Dudley.

[Further correspondence on this subject has been unavoidably held over for the next issue.—Ed. "C.A."]

Resistance of Wood to Acids

To the Editor of THE CHEMICAL AGE.

SIR,—For some time we, in the Forest Products Research Laboratory at Princes Risborough, have been interested in a study of the effect of mineral acids on a number of different woods, and we are advised that there is considerable demand among vat makers and users for woods which are known to be highly resistant to sulphuric and hydrochloric acids in particular. It is well known that the number of species of wood which are at present being used for acid tanks is limited, and it is highly probable that some of the less well-known species which are from time to time found to have acid-resisting properties might be used to advantage. Our search for such woods is rendered difficult by the fact that at the present time there seems to exist no definite basis upon which to differentiate potentially good vat woods from those which no experienced vat maker or vat user would consider.

The resistance of wood substance to acid attack is only one consideration and it is a property which we can assess without much difficulty: when the probable life of a wooden tank is considered, however, in conjunction with the factors which lead to its ultimate unsuitability for further service, the case becomes much more complicated and the need for advice from practical men is patent. It is with this in mind that we crave the hospitality of your columns in order to bring this problem to the notice of interested readers in various parts of the country. We would deem it a favour if as many vat makers and users as possible would be good enough to help us to answer the following questions:—

1. What is the highest concentration of sulphuric or hydrochloric acid ever stored in wooden tanks?
2. Are hot acids ever contained in wooden tanks, and if so, for how long at a time, and at what temperatures and concentrations?
3. What is the average life of an acid tank made from suitable wood, (a) when used under rigorous conditions, *e.g.*, strong acids and/or high temperatures, (b) when used under mild conditions, *e.g.*, cold weak acids?
4. What are the common defects which develop in wooden vats containing acids, and when are such tanks considered to be unfit for further service?—Yours faithfully,

W. H. LOVEGROVE,
Forest Products Research Laboratory.

Princes Risborough, Bucks.

From Week to Week

IMPERIAL CHEMICAL INDUSTRIES have given £100 to the Chemistry Research Laboratory at St. Andrews, for the purpose of assisting research.

THE DEGREE OF D.SC. IN CHEMISTRY, has been conferred by the University of London on Mr. A. A. Goldberg, an internal student of the Imperial College, Royal College of Science.

THE IRISH FREE STATE is voting a sum of £40,000 for the development of the kelp industry in that country in 1932-33, this amount being £4,750 lower than last year. The vote for development in regard to carrageen is £19,500, or £500 lower than in 1931-32.

AMONG THE REPRESENTATIVES of the banks and issuing houses who are leaving for America to consult with Mr. Whelpley, the new president of Cosach, on the future financing of the concern, are:—Sir Bertram Hornsby, the new chairman of the Anglo-South American Bank, and Mr. Henry Tiarks, of J. Henry Schröder and Co.

TRADE STATISTICS OF THE IRISH FREE STATE for the month of January, 1932, show an increase in the value of chemicals, drugs, perfumery, dyes and colours imported into that country during the month, the value being £76,488, as compared with £74,284 in January of last year. The value of fertilisers imported in the same period also showed an increase, £40,709 being the value shown, against £37,642 last year.

MR. K. G. LEWIS, M.Sc., has resigned his appointment as assistant lecturer in metallurgy and assaying in the Faculty of Technology, Manchester University. Mr. A. F. H. Ward, M.Sc., Ph.D. (Cambridge), has been appointed assistant lecturer in physical chemistry, and Mr. Vincent Bloomer, M.Sc. (Manchester), has been appointed assistant lecturer in electrochemistry.

UNEMPLOYMENT IN THE CHEMICAL AND ALLIED INDUSTRIES on February 22, was as follows:—Chemicals, wholly unemployed 16,323 (temporary stoppages 1,324); explosives, wholly unemployed 1,744 (temporary stoppages 209); paint, varnish, red and white lead, wholly unemployed 2,058 (temporary stoppages 198); oil, glue, soap, ink and matches, wholly unemployed 8,680 (temporary stoppages 1,228); coke oven and by-product works, wholly unemployed 3,223 (temporary stoppages 363).

A NITRATE PRICE WAR THROUGHOUT THE WORLD is threatened unless the producers of synthetic nitrate come to terms with Cosach for the formation of an international cartel. Mr. Medley Whelpley, the new president of Cosach, is credited with the intention to overhaul the combine in preparation for the price "war" as soon as his plan of reorganisation has been agreed to by the creditors and bondholders of the company. Their acceptance of the plan, which has already been approved by the Chilean Government, is expected to result from conferences to be held in New York in the near future.

REALISING THE GROWING IMPORTANCE OF GAS in respect of the city's industries the Sheffield Gas Company has appointed an industrial research chemist and opened and equipped a physical, chemical, and metallurgical laboratory at the Effingham Street works for the purpose of carrying out research work on materials and processes in connection with Sheffield trades. It is hoped that this laboratory will be of great assistance in solving the many problems which arise in connection with the use of gas as applied to industry. The furnace demonstration room has been re-established in larger and more convenient premises, also at Effingham Street.

THE POSSIBILITY THAT THE PENETRATING PARTICLES, provisionall called neutrons, recently discovered by Dr. J. Chadwick at the Cavendish Laboratory, Cambridge, may prove effective agents in extending knowledge of the artificial disintegration of the elements was suggested by Lord Rutherford in a lecture at the Royal Institution on March 18. Neutrons are believed to consist of a proton—the ultimate particle of positive electricity—and an electron—the ultimate particle of negative electricity—in close combination. They are produced when the light metal beryllium is bombarded by alpha rays—charged atoms of helium projected from radio-active elements at a speed of 10,000 miles a second—and they travel at a speed of over 18,000 miles a second.

PROFESSOR G. T. MORGAN has been appointed an examiner of theses submitted for higher degrees at the University of St. Andrews.

MR. H. J. BRETT, Commercial Secretary at Shanghai, is retiring on pension on March 31. Consequent upon Mr. Brett's retirement, Mr. Louis B. Beale, has been appointed Commercial Counsellor at Shanghai with effect from April 1, 1932.

MR. W. A. CARNEGIE has been appointed Imperial Trade Correspondent at Bulawayo. Communications intended for the Imperial Trade Correspondent should be addressed to the Royal Exchange Buildings, Abercorn Street, Bulawayo (P.O. Box 244).

AN AGREEMENT EMBRACING POTASH INTERESTS was signed at Warsaw on March 18. The signatories are the Polish Potash Exploitation Co. ("Tesp"), the German Potassium Syndicate, the Commercial Potash Co. of Alsace, the State Potash Mines of Alsace, and the Saint Teresa Potash Mines. The Polish market is reserved exclusively for the "Tesp," which is also allotted a world exploitation quota. The convention is to remain in force for five years.

TURNER AND NEWALL, LTD., announce that there is no truth in the statements that six Rhodesian mines belonging to the Rhodesian and General Asbestos Corporation, Ltd., (a subsidiary of Turner and Newall), have been closed down. The whole of the producing mines belonging to the Corporation are, it is added, still being worked on a productive basis, no change whatever having taken place during recent months. The maintenance cost of these mines is estimated to be £100,000 per year.

IN COMMEMORATION of the endowment of a Chair of Chemistry by the late Lord Trent at Nottingham University College in 1921, Professor F. S. Kipping, D.Sc., delivered a lecture there on March 18, his subject being "The Discovery of Argon and Other Rare Gases." In referring to the industrial application of neon, argon, and helium for filament lamps, and to the use of helium for filling airships, Professor Kipping said that in 1904 helium was a chemical curiosity costing £400 a cubic foot but to-day it could be obtained at a cost which almost bore comparison with coal gas.

United Glass Bottle Manufacturers, Ltd.

No Increase in Price of Bottles

SIR MAX J. BONN presided at the nineteenth annual meeting of United Glass Bottle manufacturers, Ltd., on March 16, at which a final dividend of 5 per cent., making 7½ per cent. for the year was declared. He said he particularly wished to contradict reports that, since the autumn of last year, there had been a very large increase in the price of glass bottles. This was entirely untrue, and by way of general statement he was safe in saying that so far there had been no increase at all. They, like other glass bottle manufacturers, were fully alive to the fact that although to them a glass bottle was a highly finished article, in the main it constituted but one of the many articles used by a multitude of different trades. Unless there was a further increase in their own costs over which they had no control, he did not anticipate any marked increase in the price of bottles generally, though he confidently hoped that prices would rule steadier in the best interests of the producer and the consumer. Provided they obtained their fair share of the business hitherto transacted by foreign manufacturers (the average imports for the years 1929, 1930 and 1931 amounted to about 1,400,000 gross), it would help to bring down their "oncosts" and improve their profits, at no expense to the consumer.

They had made all technical and commercial preparations to enable them to take an active part in the table-ware business, which in the past had so largely been monopolised by the foreigner. Under the trade mark "Sherdley Ware," they were about to meet the demand for the standard types of tumblers and other table-wares which lent themselves to automatic production. Certain finer grades of table glass they would not attempt to tackle at this juncture; there were many smaller concerns, who, from the general nature of their business, should be more suitably equipped for these specialities.

Weekly Prices of British Chemical Products

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE *by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market are specially supplied by Chas. Tennant and Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

THE approach of the Easter holidays had the usual influence on the demand for chemical products in London. Prices continue steady, and firmness is displayed in most directions. There is no alteration in the prices of coal tar products, the market remaining quiet. Trading in chemicals products on the Manchester market this week has not been at all active, and for the most part current bookings are for moderate quantities only with deliveries extending not too far forward. Generally speaking, quotations are steady to firm still, but it is becoming evident that, in spite of the tariff, the advance in prices has pretty well come to an end for the time being. The appreciation in the value of the pound has already, for practical purposes, wiped out most of the advantages which the 10 per cent. duty seemed likely to offer home producers. In Scotland, home inquiries are still numerous, with a slight increase in export inquiries, prices generally remaining steady. Trading in Scottish coal tar products is on a small scale, but the prices of most products are firm in tone. Cresylic acid, however, remains disappointing.

General Heavy Chemicals

ACETATE OF LIME.—MANCHESTER: Brown, £7 10s. per ton; grey, £11 to £12.

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 40%, £19 15s. per ton d/d address U.K. in casks. LONDON: Tech. 80%, £37 5s.; pure 80%, £38 5s.; 60% £28 10s.; tech. 40%, £19 15s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; technical 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80% commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½% d/d U.K.

ACID, CITRIC.—LONDON: 1s. 1½d. to 1s. 2½d. per lb., less 5%. MANCHESTER: 1s. 2d.

ACID, FORMIC.—LONDON: £51 to £52 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech.. 50% by vol., £23 10s. per ton; 50% by weight, £27 10s.; pale tech., 50% by vol., £27; 50% by weight, £32; 80% by weight, £52; edible, 50% by vol., £40. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £20 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £50 per ton in casks, £51 10s. in kegs, *£52 in casks d/d. SCOTLAND: 98/100%, £50 to £53 ex store. MANCHESTER: £2 10s. to £2 12s. 6d. per cwt., ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 1s. 1½d. to 1s. 2½d. per lb., less 5%. SCOTLAND: B.P. crystals, 1s. 1¾d. to 1s. 2d. less 5% carriage paid. MANCHESTER: 1s. 1¾d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 15s. to £9 10s. per ton according to quality and quantity. *£8 10s. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d, according to quantity.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, packed in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton, carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

ANTIMONY OXIDE.—SCOTLAND: Spot £29 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.

ARSENIC.—LONDON: £24 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £26 10s. f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £27 at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARYTES.—£7 10s. to £9 per ton according to quality.

BARIUM CHLORIDE.—LONDON: £11 10s. per ton. SCOTLAND: £11 5s. in casks, ex store.

BISULPHIDE OF LIME.—£7 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, powder £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums. SCOTLAND: £5 5s. to £5 15s., according to quantity and point of delivery.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—4½d. to 5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3¾d. per lb. Liquor £19 10s. per ton d/d U.K.

COPPERAS GREEN.—SCOTLAND: £3 15s. per ton, f.o.r., or ex works.

CREAM OF TARTAR.—LONDON: £5 7s. 6d. per cwt.

DIPHENYLGUIANIDINE.—2s. 6d. per lb.

FORMALDEHYDE.—LONDON: 28s. 6d. to 30s. 6d. per cwt. SCOTLAND: 40%, £28 per ton ex store.

HYDROGEN PEROXIDE.—LONDON: *100 vols. 10d. per lb.

INDIARUBBER SUBSTITUTES.—White, 4d. to 5½d. per lb.; Dark, 4d. to 4¾d.

LAMPBLACK.—£46 to £50 per ton.

LEAD ACETATE.—LONDON: White £42 to £44 per ton. Brown £1 per ton less. *£43 and £42 respectively ex wharf London. SCOTLAND: White Crystals £42 to £44 c.i.f. U.K. ports. Brown £1 per ton less. MANCHESTER: White, £40; Brown, £39.

LEAD NITRATE.—LONDON: £28 to £29 per ton; MANCHESTER: £29.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £20 to £22 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYL SALICYLATE.—1s. 4½d. to 1s. 6½d. per lb. net, according to quantity.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial quality 64 O.P., 1s. 8d. to 2s. 3d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

NICKEL SULPHATE.—£38 per ton d/d.

PHENOL.—LONDON: *Official price, 5½d. to 6½d. per lb.; in some directions higher prices are being asked and obtained.

PIPERIDINE RUBBER ACCELERATORS.—P.P.D., 10s. 6d. to 11s. 6d.; Z.P.D., 7s. to 7s. 6d.; L.P.D., 6s. 6d. to 7s.; P.T.D., 9s. 8d. to 10s. 4d.; C.P.D., 8s. 3d. to 8s. 10d. S.P.D., 8s. 1d. to 8s. 7d. Superac Standard 7s. Superac Z 3s. 6d.

POTASH CAUSTIC.—£30 to £33 per ton. LONDON and MANCHESTER: £40 to £42.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quality. Ground, 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports with allowance for contracts. MANCHESTER: 5d.

POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. LONDON: £32 to £33 10s. MANCHESTER: £30 to £31.

POTASSIUM CHLORATE.—3¾d. per lb. export London in 1-cwt. kegs. LONDON: £37 per ton. SCOTLAND: 99¾/100% powder, £34. MANCHESTER: £35 to £36.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £28 per ton c.i.f U.K. ports. Spot £30 per ton ex store.

* Prices quoted by other manufacturers.

POTASSIUM PERMANGANATE.—LONDON: 8d. to 8½d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8d.; B.P., 8½d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SACCHARIN.—43s. 6d. per lb. duty paid, with usual rebates.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d address in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99% £17 10s. in drums, £18 15s. in casks. Solid 76/77% £14 10s. in drums. 70/72% £14 12s. 6d. carriage paid buyer's station; minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 contracts.

SODA CRYSTALS.—Spot £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—97/98%, £21 per ton; LONDON: £22.

SODIUM BICARBONATE.—Refined spot £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with usual discounts for contracts. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—2¾d. per lb. LONDON: £30 to £32 per ton. MANCHESTER: £32.

SODIUM CHROMATE.—3⅜d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15 to £15 10s.

SODIUM NITRITE.—Spot £19 to £22 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: *10d. per lb.

SODIUM PHOSPHATE.—£13 to £15 per ton f.o.r. London casks free. LONDON: Dibasic, £13 per ton. MANCHESTER: £13 10s.

SODIUM PRUSSIATE.—LONDON: 5d. to 6½d. per lb. SCOTLAND: 5d. to 5⅜d. ex store. MANCHESTER: 5½d. to 6½d.

SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.

SODIUM SULPHIDE.—Solid 60/62% Spot £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11 10s.; commercial, £8 5s.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £18 10s. per ton f.o.b.

SULPHUR.—£12 5s. to £15 15s. per ton. SCOTLAND: Flowers, £12 10s.; roll, £12 10s.; rock, £9. Ground American, £12 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 6s. 4d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON and SCOTLAND: £12 per ton.

ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Photographic Chemicals

THERE are no changes to report in the markets for pharmaceutical and photographic products.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—5½d. to 6½d. per lb. Crude, 60's 1s. 5½d. to 1s. 6½d. per gal. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.

ACID, CRESYLIC.—99/100, 1s. 7d. to 1s. 8d. per gal.; B.P., 2s. to 2s. 3d.; Refined, 1s. 10d. to 2s.; Pale, 98%, 1s. 7d. to 1s. 8d.; Dark, 1s. 4d. to 1s. 4½d. LONDON: 98/100%, 1s. 6d. Dark 95/97%, 1s. 4d. SCOTLAND: Pale 99/100%, 1s. 3½d. to 1s. 4½d.; 97/99%, 1s. 1½d. to 1s. 2½d.; dark 97/99%, 1s. 0½d. to 1s. 1½d.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works crude 7d. to 7½d. per gal. Standard motor, 1s. 2d. to 1s. 3d.; 90%, 1s. 3d. to 1s. 4d. Pure, 1s. 6d. to 1s. 7d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motor, 1s. 3½d. to 1s. 4½d.; 90%, 1s. 9½d. to 1s. 10½d.

CREOSOTE.—Standard for export, 4¾d. to 5d. nett per gal. f.o.b. for Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3¾d. to 4⅜d. SCOTLAND: Specification oils, 3¼d. to 4d.; washed oil, 4d. to 4½d.; light, 4d. to 4½d.; heavy, 4½d. to 5d.

NAPHTHA.—Solvent, 90/160, 1s. 3d. to 1s. 4d. per gal.; 95/160, 1s. 4d. to 1s. 6d.; 90/190, 11d. to 1s. 2d. LONDON: Solvent, 1s. 1½d. to 1s. 2d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160, 1s. 3d. to 1s. 3½d.; 90/190, 1s. 1d. to 1s. 2d.

NAPHTHALENE.—Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.

PITCH.—Medium Soft, £4 10s. to £4 15s. per ton in bulk at makers' works. LONDON: £4 2s. 6d. to £4 7s. 6d. f.o.b. East Coast port. MANCHESTER: £4 to £4 10s. f.o.b. SCOTLAND: Coal tar pitch, £4 to £4 5s. per ton; export, £3 15s. to £4; blast furnace, £3.

PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.

REFINED COAL TAR.—SCOTLAND: 5d. to 5½d. per gal.

TOLUOL.—90%, 2s. 6d. per gal.; Pure, 2s. 9d.

XYLOL.—1s. 10d. per gal.; Pure, 2s. 1d.

Intermediates and Dyes

IN the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID, BENZOIC, B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.

p-CRESOL.—34·5° C.—1s. 9d. per lb., in ton lots.

DICHLORANILINE.—2s. 2d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.

DINITROBENZENE.—8½d. per lb.

DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C., 8¾d. per lb.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £75 per ton in 1-ton lots, d/d buyer's works.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 6½d. per lb.; 5-cwt. lots, drums extra, d/d buyer's works.

NITRONAPHTHALENE.—8½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb. 100% d/d buyer's works.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 9d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 10s. per ton. Grey, £12 10s. per ton. Liquor, 8d. to 9d. per gal.

ACETIC ACID, TECHNICAL, 40%.—£16 15s. to £17 15s. per ton.

ACETONE.—£63 to £65 per ton.

AMYL ACETATE, TECHNICAL.—95s. to 100s. per cwt.

CHARCOAL.—£7 10s. to £11 per ton, according to grade and locality.

IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gal.

METHYL ACETONE.—40/50%.—£52 per ton.

WOOD CREOSOTE.—1s. to 2s. 6d. per gal., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 10s. to £6 per ton.

BROWN SUGAR OF LEAD.—£32 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—*Export.*—The demand continues satisfactory, but as there appears to be no shortage of supplies the market remains steady at £5 5s. f.o.b. U.K. port in single bags. *Home.*—The home consuming season is at its height, and merchants report that deliveries show a considerable increase on those of last year. The price remains unchanged at £7 per ton delivered in 6-ton lots to consumer's nearest station.

IMPORTED NITRATE OF SODA.—The price remains at £9 per ton. Stocks in the market before the imposition of the Customs Duty were

* Prices quoted by other manufacturers.

considerable, and some time will elapse before these are liquidated.

NITRO-CHALK.—A good demand is reported; the price remains at £7 5s. per ton delivered to farmer's nearest station.

Latest Oil Prices

LONDON, March 22.—LINSEED was barely steady at about previous levels. Calcutta, March-April, to London, £10 15s.; Bombay, March-April, £11 15s.; sellers: La Plata, March-April and April-May, to Hull, £8 6s. 3d.; May-June, £8 7s. 6d.; June-July, £8 10s.; July-August, £8 12s. 6d., sellers. RAPESEED was neglected. Toria, March-April to Hull/Continent, £11 2s. 6d. sellers. COTTONSEED was steady but quiet. Egyptian black, March, to Hull, £6 5s.; April, £6 6s. 3d.; May, £6 7s. 6d.; sellers. Sakellaridis, March, £5 18s. 9d.; April, £6; May £6 1s., sellers. CASTORSEED was slow. Bombay, March-April, to Hull, £12 15s. sellers. GROUNDNUTS were easy. Coromandel (machined), March, to Rotterdam/Hamburg, £17 1s. 3d.; April, £17; May, £17 3s. 9d.; June, £17 7s. 6d.; August, £17 17s. 6d. sellers. PALM KERNELS were dull. To Liverpool/Hamburg, March-April and April-May, £11 6s. 3d., sellers; buyers, 1s. 3d. less. LINSEED OIL was quiet. Spot, ex mill, £15 5s.; April, £13 15s.; May-August, £14 17s. 6d.; September-December, £16 2s. 6d., naked. RAPE OIL was neglected. Crude extracted, £30 10s.; technical refined, £32 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £21 10s.; refined common edible, £26; deodorised, £28, naked, ex mill. TURPENTINE was steady. American, spot, 55s. 9d.; April, 55s. 6d. per cwt.

HULL, March 22.—LINSEED OIL, spot and March, closed at £13 10s. per ton; April, £13 15s.; May-August, £14 15s.; September-December, £15 15s. COTTON SEED.—Egyptian, black, spot, £22; edible, refined, spot, £24 10s.; technical, spot, £24 10s. deodorised, £26 10s. naked. PALM KERNEL OIL, crude, f.m.q., spot, £24, naked. GROUNDNUT OIL, crushed/extracted, spot, £36 10s.; deodorised, £40 10s. RAPE OIL, crushed/extracted, spot, £29; refined, £31. SOYA OIL, crushed/extracted, spot, £22 10s.; deodorised, £26 per ton. COD OIL, nominal. CASTOR OIL, pharmacy, spot, 47s. 6d.; first, 42s. 6d.; second, 40s. 6d. per cwt.

Economic Conditions in Peru

IN the introduction to the Report on Economic Conditions in Peru, which has just been published by the Department of Overseas Trade (H.M. Stationery Office, price 2s. 8d. post free) it is observed that since 1919 Peru had been advancing towards the prominent position among South American Republics for which her latent wealth, both mineral and agricultural, fitted her, but with the arrival of the world-wide trade depression and the fall in price of Peru's staple exports of cotton and sugar and the decline in the value of her mineral exports of 1929 and 1930, a disastrous check had been set to her progress. Peru's enormous resources, however, are lying fallow and the country is unable to profit by them. Even at the present level of prices of staple exports, profits could still be made and the country would become prosperous if political stability was assured. Finance is dealt with in the second chapter of this Report, which is followed by one on the natural resources and agricultural production of the country. The fourth chapter relates to industry and contains a detailed review of the textile and other principal Peruvian industries. British trade with Peru receives comprehensive treatment in another section, attention being given to outlook, marketing methods, credit terms, etc. The final chapter relates to social questions, with the cost of living, immigration and colonisation. The three appendices which follow relate to the foreign trade of Peru. The Report is completed by an annexe giving a detailed survey of the economic conditions in Iquitos for the year 1930.

Casale Ammonia Process Improvements

THE Casale Co. is perfecting its synthetic ammonia process to further reduce production costs. At the Terni plant of the research company (Societa Italiana Ricerche Industriali) a process for purifying the nitrogen-hydrogen gas mixture has been worked out. The first industrial installation of this process began operations at the Ostend plant of the Belgian licensees about the middle of October, 1931, with, it is stated, highly satisfactory results. According to the Casale Co., the units at Ostend have a rated capacity of 8 tons of ammonia. Since the introduction of the S.I.R.I. purifying system, it is said that they have been giving steadily an average of 17 tons of anhydrous ammonia per day during the two months the process has been under operation. The Casale Co. states it has made arrangements with the S.I.R.I. for licensing rights for this gas mixture purifying process.

Points from Manufacturers' Literature

The Editor welcomes copies of new brochures and leaflets describing plant, equipment and products of interest to chemical manufacturers and the chemical using trades.

HEENAN AND FROUDE, LTD., of Worcester, who have lately acquired the designs and sole manufacturing rights of the S. and C. baling presses, are now introducing these machines to prospective users by means of a special leaflet. These presses were first placed on the market in 1920, since when over 400 of them have been supplied to various industries where they are dealing with factory waste such as the scraps and trimmings of ferrous and non-ferrous metals, paper and cardboard, leather, rags, cotton waste and other similar fibrous material. A special feature, not obtainable on the usual class of press, is incorporated in the S. and C. press, which during its operation exerts an increasing ram pressure on the material as the latter becomes denser, and consequently a very compact bale is obtained. Under these circumstances and when dealing with the greater majority of metal scrap, the bale is entirely self-binding, and no wiring is required.

* * *

CREXYLOL, a sweet diluent for use in the lacquer industry, is described in a folder issued by Rex Campbell and Co., Ltd., of 7 Idol Lane, London, E.C.3. This product is water-white, non-sulphurous, moisture free, uniform in bulk and guaranteed to specification. As a substitute or partial substitute for toluol, which is a by-product liable to sudden shortage and consequent price fluctuation, it deserves the careful consideration of every lacquer manufacturer and user. The flash point of the various grades offered varies from 78° to 83° F. The commercial grade has a flash point of 80° F., and a boiling range of 145°-148° C. The dilution ratio with amyl acetate is 2.2 (the same as toluol), but with tricresyl phosphate it is 5.0 (as compared with 4.0 for toluol).

* * *

HOMOGENEOUS LEAD LININGS are described in a leaflet which has been received from John Thompson (Dudley), Ltd. These linings are applied by a method in which the lead is welded to the metal from which the vessels are made, such linings are therefore one with the vessels, and stripping and sagging is impossible. For many years this firm has been lining all types of vessels used for chemical work by their special homogeneous lead lining process, and owing to the increasing demand for this class of work, they have been encouraged to lay down special equipment to deal with all classes of homogeneous lead lining. Chemical plant can be supplied lined with best chemical lead to withstand 28 in. vacuum without blistering, and can be used for operations where severe conditions of alternating vacuum and pressure are imposed. The sagging and creeping of lead sheet that is a feature of loose lead linings is thereby completely avoided, and as no acid or condensation products can get between the lead lining and the steel vessel, the length of life of a homogeneously lead-lined vessel is considerably longer than one that has been loosely lead-lined. Another advantage is that should localised corrosion of the lining occur at any point after a prolonged use, patching can be easily effected without interference with the remainder of the coating. The lead used for their linings is of best chemical quality, giving a flash-point of over 300° C.

* * *

IN THE REVISED EDITION OF THEIR BOOKLET on aluminium alloys, Birmabright, Ltd., of Dartmouth Road, Smethwick, near Birmingham, a considerable amount of fresh data has been added to make it adequate for all possible users of the well-known alloy, Birmabright. In the sphere of chemical engineering it is indicated that Birmabright is unaffected by boiling glacial acetic acid and acetic anhydride, even after prolonged usage. It has therefore been the means of making such fittings as cocks, valves, level gauges, manhole covers, etc., that do not discolour the acid and give long service. It has also been used in wrought forms for the fabrication of cooling coils and large revolving crystallisers for pharmaceutical products where cooling is effected by spraying water on to the outside of the cylinder. This alloy is unaffected by and does not affect the colour of turpentine or linseed oil and therefore finds useful application in varnish making plant.

RAYMOND EQUIPMENT

selected for 10 distinctly different purposes

The following recent orders for RAYMOND EQUIPMENT *emphasise the wide application to materials which are distinctly different*

For Separating HYDRATED LIME

For Grinding DI-CALCIUM PHOSPHATE

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For Grinding MOULDING COMPOUNDS

For Grinding RUBBER CHEMICALS

For Grinding IRON OXIDES

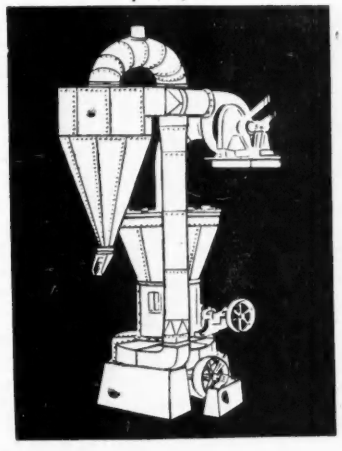
For Grinding LEAD PIGMENTS

For Grinding CHLORIDE OF LIME

For Grinding CALCINED BONES

For Separating MAGNESIA

The Raymond Equipment is absolutely Dustless in operation.



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Hardraymil Westcent London.

DUSTLESS GRINDING

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2. at 1s. each.

362,204. METHYL ISOBUTYL KETONE AND CARBINOL. Usines de Melle, Melle, Deux-Sèvres, France. International Convention date, January 7, 1930.

Acetone is condensed to produce diacetone alcohol which is then dehydrated into mesityl oxide followed by hydrogenation to methyl isobutyl ketone and carbinol.

362,215. ESTERS. Standard Oil Development Co., 7 West 10th Street, Wilmington, Del., U.S.A. (Assignees of P. K. Frolich, 931 Park Avenue, Elizabeth, N.J., and P. L. Young, 72 Barrow Street, New York.) International Convention date, January 21, 1930.

A stream of hydrocarbons rich in olefines is passed in countercurrent with an anhydrous liquid organic acid such as glacial acetic acid in the presence of sulphuric acid. The temperature is 50°—150° C. and contact is maintained for 2—4 hours. The fluid product is continuously withdrawn, and the ester is extracted by a low-boiling hydrocarbon such as pentane, hexane or gasoline. The solvent is separated by distillation, the ester recovered, and the solvent and sulphuric acid used again. The apparatus is described.

362,267. DYES. Chemische Fabrik vorm. Sandoz, Basle, Switzerland. International Convention date, March 8, 1930.

Indophenols and leuco-indophenols are treated with alkali metal polysulphides in the presence of salts of non-hydroxylated aromatic nitro-sulphonic acids not containing an amino group, such as sodium *m*-nitrobenzene-sulphonate, to obtain blue to blue-violet dyes.

362,354. DESTRUCTIVE HYDROGENATION. H. D. Elkington, London. From Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij, 30 Carel Van Bylandtlaan, The Hague. Application date, August 25, 1930.

Carbonaceous materials are destructively hydrogenated at high temperature and pressure, *e.g.*, 430° C. and 100 atmospheres pressure, in the presence of a catalyst consisting of colloidal rhenium or its compounds on a carrier such as active carbon together with other metals or compounds in colloidal form, *e.g.*, molybdenum. These catalysts are also suitable for refining or desulphurising petroleum products, or for converting phenols or cresols into hydrocarbons without splitting the molecules.

362,441. ANTHRAQUINONE DERIVATIVES. Imperial Chemical Industries, Ltd., Millbank, London, R. F. Thomson and W. W. Tatum, Earl's Road, Grangemouth. Application date, July 28, 1930.

Dyestuffs for acetate silk and intermediates for acid wool colours are obtained by condensing a halogenated acylaminoanthraquinone with an amine of the benzene series containing at least two amino groups, with or without a copper catalyst and an acid absorber. The acyl groups may afterwards be removed by hydrolysis.

362,696. DYES AND INTERMEDIATES. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 22, 1930. Addition to 308,651.

Benzanthrone-*peri*-dicarboxylic acid, anhydride or a derivative, including a ring substitution product, is condensed with an aromatic *o*-diamine at a temperature below 80° C. The resulting dicarboxylic imides may be further ring-closed by heating to a higher temperature. A number of examples are given.

362,458. ESTERS. British Industrial Solvents, Ltd., 2 Pall Mall East, London. From Deutsche Gold-und Silber-Scheideanstaldt vorm. Roessler, 107 Schliessfach, Frankfort-on-Main, Germany. Application date, September 4, 1930.

Aldehydes are condensed to esters using an aluminium alcoholate as condensing agent. The combination of aluminium and an alcohol, *e.g.*, butyl alcohol, is effected at the same time in the presence of a pre-formed alcoholate free from other auxiliary substances. The aluminium butylate may be employed in the form of a suspension in the alcohol. An example is given.

Specifications Accepted with Date of Application

368,114. Mono-calcium-orthophosphate, Process of producing pure white. S. Martin. April 13, 1931.

368,155. Monocalcic phosphate, Method of stabilising—in its solutions, and in its transformation into other soluble phosphates, particularly alkaline phosphates. J. Margoles. May 27, 1930.

368,156. Nebulating sulphur, Method of, and apparatus for. G. Rupprecht. May 27, 1931.

368,164 Acetylene from hydrocarbons by means of an electric arc, Manufacture of. Soc. of Chemical Industry in Basle. June 6, 1930.

368,193. Rubber latex, Preservation of. Naugatuck Chemical Co. August 27, 1930.

368,256. Vulcanising mixtures, Manufacture of. J. Y. Johnson. (*I. G. Farbenindustrie.*) Oct. 27, 1930.

368,257. Hydrocarbons, Conversion of. J. Y. Johnson. (*I. G. Farbenindustrie.*) Oct. 27, 1930.

368,291. Hydrocarbons, Conversion of—at higher temperatures. J. Y. Johnson. (*I. G. Farbenindustrie.*) Oct. 24, 1930.

368,294 and 368,315. Vat-dyestuff preparations, Production of. Newport Chemical Corporation. Feb. 26, 1930, and Nov. 21, 1929.

368,306. Calcium hypochlorite products, Manufacture of. J. A. M. W. Mitchell, F. T. Meehan, and Imperial Chemical Industries, Ltd., Dec. 3, 1930.

368,348. Acetic acid, Manufacture of. British Celanese, Ltd., H. F. Oxley and W. H. Groombridge. Dec. 4, 1930.

368,316. Pure arsenious oxide from arsenical products, Production of. Norddeutsche Affinerie. Nov. 26, 1929.

368,373. Aromatic amines, Manufacture of. J. Y. Johnson. (*I. G. Farbenindustrie.*) Dec. 4, 1930.

368,401. Nitrogen oxides from nitrosyl chloride, Recovery of. Kali-Forschungs-Anstalt Ges. May 20, 1930. Addition to 329,200.

368,424. Cyanamides of the alkaline earth metals, Manufacture of. J. Y. Johnson. (*I. G. Farbenindustrie.*) Dec. 17, 1930.

368,426. Removing sulphur from producer gas, Process of. Premix Gas Plants, Ltd., and A. Docking. Dec. 17, 1930. Addition to 329,973.

368,437. Hydrocyanic acid, Catalytic manufacture of. J. Y. Johnson. (*I. G. Farbenindustrie.*) Dec. 24, 1930.

368,505. Thioindigoid vat dyestuffs, Manufacture of. I. G. Farbenindustrie Akt.-Ges. Feb. 22, 1930. Addition to 29118/30.

368,509-10. Rubber, Manufacture of. Soc. Italiana Pirelli. Feb. 28 and Mar. 3, 1930.

368,530. Oxalkyl compounds, Manufacture of. I. G. Farbenindustrie. Mar. 18, 1930.

368,552. Organic acids, Manufacture of. J. Y. Johnson. (*I. G. Farbenindustrie.*) Apr. 7, 1931.

368,556. Electrolytic purification of hydrogen peroxide solutions, Apparatus for. Oesterreichische Chemische Werke Ges. Aug. 18, 1930.

368,559. Fertilisers, Manufacture of. E. Urbain. April 14, 1930.

368,590. Substituted carboxylic acid amides, Manufacture of. Soc. of Chemical Industry in Basle. May 9, 1930.

368,598. Formates, Production of. H. Frischer. May 15, 1931.

368,613. 1-phenyl-2-amino-alcohols-1 containing hydroxyl in the phenyl residue, Manufacture of. I. G. Farbenindustrie. May 31, 1930.

368,626. Alkali nitrate and hydrochloric acid, Manufacture of. A. Mentzel. July 22, 1930.

368,675. Calcium carbide, Manufacture of. Akt.-Ges. für Stickstoffdunger. Nov. 10, 1930.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Merz, F. (*Merz and Co.*) Process for making stable solutions of morphine. 6766. March 7. (Germany, March 28, '31.)

Mond, A. L. (*Universal Oil Products Co.*). Treatment of hydrocarbon oils. 6818. March 7.

Potts, H. E. (*International Hydrogenation Patents Co., Ltd.*). Production of valuable products from hydrocarbons. 7411. March 12.

—— Utilization of nitrogen from nitrosyl chloride. 6834. March 7. (Germany, July 9, '31.)

Shaw, H. S. Hele-. (*Stream Line Filter Co., Ltd.*) Filters. 7312. March 11.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette, &c.

Winding-Up Petition

BOLGAR OIL PROCESSES, LTD. (W.U.P., 26/3/32.) A petition for the winding-up of this company by the High Court of Justice was, on March 16, presented by Laszlo Bolgar, of V. 16 Czaky-Utca, Budapest, Hungary, a creditor of the company and is to be heard at the Royal Courts of Justice, Strand, London, on April 11.

Company Winding Up Voluntarily

EUROPEAN CYANAMIDE EXPORT CO., LTD. (C.W.U.V., 26/3/32.) By special resolution, March 14. Mr. John Alison Terrace and Mr. Alexander Martin appointed joint liquidators. Creditors' claims to the liquidators at Adelaide House, King William Street, London, by April 4.

Chemical Trade Inquiries

These inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country) except where otherwise stated.

CANADA.—A Toronto firm desires to purchase in the United Kingdom a compressor capable of compressing hydrogen to a pressure of 2,000 lb. per sq. in. in steel bottles or tanks. (Ref. No. G.X. 11293.)

PERSIAN GULF.—The Indian Stores Department is calling for tenders, to be presented in New Delhi by April 7, for the supply and erection of an oil fixed condensing plant with shares for two years' normal working. (Ref. No. G.X. 11301.)

NATAL.—A Natal firm desires to receive quotations from United Kingdom manufacturers of ammonia tubes in sizes from ¼ in. to 2 in. (Ref. No. G.X. 11298.)

New Companies Registered

ADLEY, TOLKIEN AND CO., LTD. Registered March 10. Nominal capital £6,000 in £1 shares. To acquire the business of chemical manufacturers and merchants carried on by Adley, Tolkien and Co., Ltd., at Novas Chemical Works, Paterson Street, Blackburn, and to adopt an agreement with the said company and W. H. Marsden. Directors: F. Tolkien, Ripley Chase, The Goffs, Eastbourne; A. C. H. Robinson, R. E. Coombe, L. H. L. Saunders.

CROASDALE AND SONS, LTD. Registered March 9. Nominal capital £1,000 in £1 shares. Pharmaceutical, consulting, analytical, manufacturing, wholesale and retail chemists, etc. Directors: J. C. Croasdale, 28 Crown Street, Bury St. Edmunds; A. H. Croasdale, J. A. Croasdale.

MOULDING POWDERS, LTD, 40/43 Norfolk Street, Strand, London, W.C.2. Registered March 10. Nominal capital £3,000 in £1 shares. Manufacturers of and dealers in moulding powders and moulded products, condensation and composition products, resins, gums, paints, varnishes, etc.

SHIP CANAL OIL STORAGE CO., LTD., 6 Brown Street, Manchester. Registered March 7. Nominal capital £10,00 in £1 shares. Storers, public wharfingers, manufacturers, producers, distillers, and importers of oils, lubricants, greases, tallow, paraffin, benzol, motor spirits, tar, petroleum and oil fuels, etc. Directors: F. Wheatcroft, W. Smith.

THE THRACIAN GALENA PRODUCTS, LTD., 219 Grand Buildings, Trafalgar Square, London, W.C.2. Registered as a "private" company on March 9. Nominal capital £100,000 in £1 shares. The objects are to manufacture, deal in or turn to account minerals and mineral products; to acquire certain processes, inventions and patents relating thereto for the manufacture or treatment of lead ore or lead concentrate, and for the manufacture of lead pigments, lead products and by-products in the Near East or elsewhere; to carry on the business of manufacturers of lead pigments and paints, oil and colour men, chemical manufacturers or merchants, etc. Directors: Sir Arthur H. Crosfield, Bt.; A. H. Jackson, P. A. Ivanoff, S. S. Webb-Bowen, T. H. Evans.

Company News

S.A. FABRIQUE DE SOIE ARTIFICIELLE DE TOMASGOW.—A dividend for 1931 of zloty 2, or 14.77d. per share, less British tax, has been declared. In 1930, 12.44d. per share was paid.

A TRANSPOSITION OF LINES in this column last week made it appear that British Drug Houses, Ltd., was holding an annual meeting on Monday last. The reference to the meeting should have been 19 lines further down the column and should have formed part of the paragraph relating to Waxed Papers, Ltd.

WRIGHT, LAYMAN AND UMNEY, LTD.—For the year 1931, the trading profit was £44,439. The directors recommend a final dividend of 12½ per cent. on the ordinary shares and a bonus of 17½ per cent., making a total distribution of 42½ per cent. for the year. They propose to transfer £13,000 to special reserve fund to provide for depreciation in the value of freehold and leasehold land and buildings, leaving £14,615 to be carried forward.

THE BRITISH ALUMINIUM CO., LTD.—The Company announces that net profits for 1931, after providing for debenture interest, were £172,427, which compares with £243,549 in the previous year. Depreciation reserve and staff benefit fund receive respectively a further £50,000 and £10,000, and an ordinary dividend of 5 per cent. is recommended, leaving £49,872 to go forward. No interim was paid on the ordinary shares.

ASSOCIATED PORTLAND CEMENT MANUFACTURERS, LTD.—The directors announce that, subject to completion of audit, they are recommending at the forthcoming general meeting the payment of dividends in respect of 1931; of 8 per cent. (less tax) on the 3,000,000 ordinary shares issued prior to August, 1931, being the same as in 1930, and 4 per cent. (less tax) on the 500,000 shares issued in August, 1931. Provision, it is stated, has been made for the sinking funds, and £312,150 for depreciation reserves. In the previous year depreciation reserves received £267,150. It is pointed out that the increase in the depreciation reserves as compared with 1930 is consequent upon the absorption of the works of the "Red Triangle" group of companies which were acquired as from July 1, 1931.

INDESTRUCTIBLE PAINT AND STANDARD VARNISH CO.—The company's subsidiaries, with the exception of the German company, are stated to have all been operated profitably during the year 1931. The report shows that net profits amounted to £34,503. The directors recommend transferring to reserve for income tax £3,500 and to reserve account £5,000. A final dividend of 5 per cent., less tax at 2s. 9d. is recommended, making 9 per cent., less tax, for the year as compared with 17½ per cent., free of tax, for the previous year. It is proposed to place to reserve the sum of £25,000, as against £22,861 in 1930. The amount to be carried forward will be £46,365, as against £45,324 brought in. The annual meeting will be held on April 6.

DOMINION TAR AND CHEMICAL CO.—The combined earnings for the year 1931, after deducting operating, management and selling expenses, exclusive of earnings applicable to minority share interests, were $1,279,760; from this is deducted provision for depreciation $500,827, debenture interest $326,837, provision for exchange and premium paid on debenture coupons $34,539, dividends paid and declared on preferred shares of Dominion Tar $327,275 and Alberta Wood Preserving Co., Ltd., $26,148, transfer to preferred stock sinking fund—reserve of subsidiary company, $2,567, income tax paid and provided for $58,613, leaving a balance of net profits for the year of $2,954, to which is added the surplus at December 31, 1930, $991,046, leaving a surplus at December 31, 1931, of $994,000.

Dismantled Chemical Plant

A WIDE range of chemical plant from dismantled works, which were forced to close down during the recent period of trade depression, is now being offered for sale by Oliver Ashworth and Co., of Castlegrounds, Bury, Lancs. This firm issues illustrated lists which are distinctly useful in giving the prospective purchaser a composite idea of the type of plant which is offered for sale.